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Volume VI

V. L. Komarov, Editor

Centrospermae

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(Flora SSSR)

Volume VI

Centrospermae

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TABLE OF CONTENTS

	Russian page*	English page
Systematic Index of Species in Volume VI	vii	ix
Preface	v	1
Order 19. Centrospermae Engl.	1	3
Key to Families	1	3
Family LIII. Chenopodiaceae Less.	2	4
I. Key to Genera	6	7
II. Key to Genera	15	13
Subfamily 1. Cyclolobeae C.A.M.	29	23
Tribe 1. Polycnemeae Dumort.	29	23
Genus 397. Polycnemon L.	29	23
Tribe 2. Hablitzieae Ulbrich	32	26
Genus 398. Hablitzia M.B.	32	26
Tribe 3. Beteae Moq.	33	26
Genus 399. Beta L.	33	27
Tribe 4. Chenopodieae C.A.M.	40	32
Genus 400. Chenopodium L.	41	32
Genus 401. Monolepis Schrad.	73	58
Tribe 5. Atripliceae C.A.M.	74	59
Genus 402. Spinacia L.	75	59
Genus 403. Atriplex L.	77	61
Genus 404. Eurotia Adans.	108	84
Genus 405. Ceratocarpus L.	110	85
Genus 406. Axyris L.	112	87
Tribe 6. Camphorosmeae Moq.	116	90
Genus 407. Camphorosma L.	116	90
Genus 408. Panderia Fisch. et Mey.	119	93
Genus 409. Kirilowia Bge.	123	94
Genus 410. Londesia Fisch. et Mey.	124	96
Genus 411. Echinopsilon Moq.	124	96
Genus 412. Kochia Roth	127	99
Tribe 7. Corispermeae Moq.	135	105
Genus 413. Corispermum L.	135	105
Genus 414. Agriophyllum M.B.	158	122
Genus 415. Anthochlamys Fenzl	162	125

* [Russian page numbers appear in the left-hand margin of the text.]

Tribe 8. Salicornieae Dum.	165	127
Genus 416. Kalidium Moq.	166	127
Genus 417. Halopeplis Bge.	168	130
Genus 418. Halostachys C.A.M.	169	130
Genus 419. Halocnemum M.B.	170	131
Genus 420. Salicornia L.	172	132
Subfamily 2. Spirolobeae C.A.M.	173	134
Tribe 9. Suaedeae Rchb.	173	134
Genus 421. Suaeda Forsk.	174	134
Genus 422. Alexandra Bge.	198	153
Genus 423. Borszczowia Bge.	199	154
Genus 424. Bienertia Bge.	199	155
Tribe 10. Salsoleae C.A.M.	200	156
Genus 425. Salsola L.	200	156
Genus 426. Noaea Moq.	266	206
Genus 427. Aellenia Ulbrich	270	209
Genus 428. Rhabdophyton Iljin	271	209
Genus 429. Horaninowia Fisch. et Mey.	272	210
Genus 430. Seidlitzia Bge.	275	212
Genus 431. Ofaiston Rafin.	276	213
Genus 432. Girgensohnia Bge.	277	214
Genus 433. Anabasis L.	281	217
Genus 434. Arthrophytum Schrenk.	302	233
Genus 435. Iljinia Eug. Kor.	309	238
Genus 436. Haloxylon Bge.	310	239
Genus 437. Nanophyton Less.	314	243
Genus 438. Petrosimonia Bge.	316	244
Genus 439. Halocharis Moq.	327	251
Genus 440. Halimocnemis C.A.M.	329	253
Genus 441. Halotis Bge.	338	260
Genus 442. Piptoptera Bge.	339	261
Genus 443. Halanthium C. Koch	340	263
Genus 444. Gamanthus Bge.	346	266
Genus 445. Cornulaca Del.	350	269
Genus 446. Halogeton C.A.M.	350	269
Genus 447. Sympegma Bge.	353	271
Family IV. Amaranthaceae Juss.	354	272
Key to Genera	355	273
Genus *Celosia L.	355	273
Genus 448. Amaranthus L.	356	275
Genus 449. Achyranthes L.	367	281
Genus 450. Alternanthera Forsk.	368	282
Genus 451. Gomphrena L.	369	283

Family LV. Nyctaginaceae Lindl.	370	283
Genus 452. <i>Mirabilis</i> L.	370	284
Family LVI. Thelygonaceae Eichl.	371	285
Genus 453. <i>Thelygonum</i> L.	372	285
Family LVII. Phytolaccaceae Lindl.	372	286
Genus 454. <i>Phytolacca</i> L.	373	286
Family LVIII. Aizoaceae A.Br.	374	287
Genus 455. <i>Mollugo</i> L.	374	287
Genus 456. <i>Glinus</i> Loefl.	375	288
Genus 457. <i>Aizoon</i> L.	376	288
Family LIX. Portulacaceae Lindl.	376	289
Key to Genera	377	289
Genus 458. <i>Claytonia</i> Gronov.	377	289
Genus 459. <i>Montia</i> Mich.	384	294
Genus 460. <i>Portulaca</i> L.	386	296
Family LX. Caryophyllaceae Juss.	386	296
Key to Subfamilies	387	297
Subfamily 1. Alsinoideae Vierh.	387	297
Key to Tribes	387	297
Tribe 1. Alsineae Pax	387	297
Key to Genera	387	297
Genus 461. <i>Stellaria</i> L.	389	299
Genus 462. <i>Krascheninnikowia</i> Turcz.	423	326
Genus 463. <i>Malachium</i> Fries	430	330
Genus 464. <i>Cerastium</i> L.	430	330
Subgenus 1. <i>Dichodon</i> (Bartl.) Fenzl	435	334
Subgenus 2. <i>Eucerastium</i> (Boiss.) Pax	439	336
Genus 465. <i>Holosteum</i> L.	466	359
Genus 466. <i>Sagina</i> L.	471	361
Genus 467. <i>Buffonia</i> L.	475	365
Genus 468. <i>Lepyrodiclis</i> Fenzl	480	368
Genus 469. <i>Queria</i> Loefl.	481	369
Genus 470. <i>Minuartia</i> L.	482	370
Genus 471. <i>Ammodenia</i> Patr.	516	397
Genus 472. <i>Arenaria</i> L.	517	398
Subgenus 1. <i>Eremogone</i> Fenzl	520	400
Subgenus 2. <i>Monogone</i> (Maxim.) Schischk. ..	536	411
Subgenus 3. <i>Euthalia</i> Fenzl	537	412
Genus 473. <i>Moehringia</i> L.	540	414
Genus 474. <i>Merckia</i> Fisch.	545	416
Genus 475. <i>Thylacospermum</i> Fenzl	545	418
Tribe 2. Scleranthae Vierh.	546	419
Genus 476. <i>Scleranthus</i> L.	546	419
Subgenus 1. <i>Euscleranthus</i> Pax	547	419

Subfamily 2. Paronychioideae Vierh.	549	421
Key to Tribes	549	421
Tribe 1. Sperguleae Vierh.	549	421
Key to Genera	550	421
Genus 477. Spergula L.	550	421
Genus 478. Spergularia (Pers.) J. et C. Presl. ...	556	426
Genus 479. Alsine L.	562	430
Tribe 2. Telefieae DC.	562	430
Genus 480. Telephium L.	562	430
Tribe 3. Polycarpeae DC.	563	431
Genus 481. Polycarpon Loebl.	564	431
Tribe 4. Paronychieae Pax	564	432
Key to Genera	564	432
Genus 482. Paronychia Adans.	565	432
Genus 483. Herniaria L.	566	433
Tribe 5. Pterantheae Endl.	572	437
Genus 484. Pteranthus Forsk.	572	437
Subfamily 3. Silenoideae A. Br.	573	438
Key to Tribes	573	438
Tribe 1. Lychnideae A. Br.	573	438
Key to Genera	573	439
Genus 485. Agrostemma L.	574	439
Genus 486. Viscaria Roehl.	576	440
Genus 487. Silene L.	577	442
Subgenus 1. Behen (Moench) Bge.	595	456
Subgenus 2. Eusilene (Rohrb.) Pax	602	461
Subgenus 3. Otites (Adans.) Schischk.	685	523
Subgenus 4. Conosilene (Rohrb.) Williams ...	690	526
Genus 488. Lychnis L.	692	528
Genus 489. Coronaria L.	699	533
Genus 490. Melandrium Roehl.	701	534
Subgenus 1. Elisanthus (Fenzl) Schischk.	704	537
Subgenus 2. Gastrolychnis (Fenzl) Schischk.	714	544
Subgenus 3. Eumelandrium (A. Br.) Schischk. ...	724	551
Genus 491. Petrocoma Rupr.	728	553
Genus 492. Cucubalus L.	729	555
Tribe 2. Diantheae Pax	730	555
Key to Genera	730	555
Genus 493. Gypsophila L.	731	556
Subgenus 1. Rokejeka (Forsk.) Graebn.	738	562
Subgenus 2. Dichoglottis (Fisch. et Mey.) Endl.	772	588
Subgenus 3. Macrorrhizaea Boiss.	774	589
Subgenus 4. Hagenia (Moench) A. Br.	776	591
Genus 494. Tunica (Hall.) Scop.	777	591
Genus 495. Kohlrauschia Kunth	779	593

Genus 496. <i>Acanthophyllum</i> C.A.M.	780	594
Subgenus 1. <i>Euacanthophyllum</i> (Boiss.)		
Schischk.	783	597
Subgenus 2. <i>Allochrusa</i> (Bge.) Schischk. . . .	799	608
Genus 497. <i>Vaccaria</i> Medic.	802	610
Genus 498. <i>Dianthus</i> L.	803	611
Subgenus 1. <i>Armeriastrum</i> Ser.	812	617
Subgenus 2. <i>Caryophyllum</i> Ser.	822	624
Genus 499. <i>Saponaria</i> L.	861	654
Genus 500. <i>Velezia</i> L.	869	659
Addenda V (Diagnoses of New Species Mentioned in Volume VI) . . .	871	661
Index Alphabeticus	915	689
Vegetation Regions of the USSR		727
List of Abbreviations		730

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SYSTEMATIC INDEX OF SPECIES IN VOL. VI *

Order 19. Centrospermae Engl.

Family LIII. Chenopodiaceae Less.

Subfamily 1. Cyclolobeae C. A. M.

Tribe 1. POLYCNEAE DUMORT.

Genus 397. *Polycnemum* L.

Russian page**

3520.	1. <i>P. arvense</i> L.	29
3521.	2. <i>P. verrucosum</i> Lang	30
3522.	3. <i>P. Heuffelii</i> Lang	30
3523.	4. <i>P. majus</i> A. Br.	31
3524.	5. <i>P. perenne</i> Litw.	31

Tribe 2. HABLITZIEAE ULBRICH

Genus 398. *Hablitzia* M. B.

3525.	1. <i>H. tamnoides</i> M. B.	32
-------	--------------------------------------	----

Tribe 3. BETEAE MOQ.

Genus 399. *Beta* L.

Section 1. *Vulgares* Transch.

3526.	1. <i>B. perennis</i> (L.) Freyn	34
3527.	2. <i>B. vulgaris</i> L.	35

Section 2. *Corollinae* Transch.

3528.	3. <i>B. macrorrhiza</i> Stev.	39
3529.	4. <i>B. lomatogona</i> Fisch. et Mey.	39
3530.	5. <i>B. trigyna</i> W. et K.	40

Tribe 4. CHENOPODIEAE C. A. M.

Genus 400. *Chenopodium* L.

Section 1. *Ambrina* Benth. et Hook.

3531.	1. <i>Ch. ambrosioides</i> L.	45
-------	---------------------------------------	----

Section 2. *Botryoides* C. A. M.

3532.	2. <i>Ch. botrys</i> L.	46
3533.	3. <i>Ch. foetidum</i> Schrad.	47
3534.	4. <i>Ch. aristatum</i> L.	47

* [This Index has been reproduced photographically from the Russian original.]

** [Russian page numbers appear in the left-hand margin of the text.]

Section 3. *Eublittum* Aellen

3535.	5. <i>Ch. foliosum</i> (Moench) Asch.	48
3536.	6. <i>Ch. Korshinskyi</i> Litw.	49
3537.	7. <i>Ch. capitatum</i> (L.) Asch.	49

Section 4. *Degenia* Aellen

3538.	8. <i>Ch. chenopodioides</i> (L.) Aellen	50
-------	--	----

Section 5. *Agatophyton* (Moq.) Benth. et Hook.

3539.	9. <i>Ch. Bonus-Henricus</i> L.	52
-------	---	----

Section 6. *Pseudoblittum* Aellen

3540.	10. <i>Ch. glaucum</i> L.	52
3541.	11. <i>Ch. rubrum</i> L.	53

Section 7. *Chenopodia* C. A. M.

3542.	12. <i>Ch. polyspermum</i> L.	54
3543.	13. <i>Ch. murale</i> L.	55
3544.	14. <i>Ch. hybridum</i> L.	55
3545.	15. <i>Ch. acuminatum</i> Willd.	56
3546.	16. <i>Ch. Vachelii</i> Hook. et Arn.	59
3547.	17. <i>Ch. urbicum</i> L.	59
3548.	18. <i>Ch. frutescens</i> C. A. M.	60
3549.	19. <i>Ch. album</i> L.	61
3550.	20. <i>Ch. opulifolium</i> Schrad.	63
3551.	21. <i>Ch. strictum</i> Roth	64
3552.	22. <i>Ch. giganteum</i> Don.	65
—	*22. <i>Ch. pratericola</i> Rydb.	65
3553.	23. <i>Ch. Sosnowskyi</i> Kapeller	66
3554.	24. <i>Ch. bryoniaefolium</i> Bge.	66
3555.	25. <i>Ch. vulvaria</i> L.	67
3556.	26. <i>Ch. viride</i> L.	68
3557.	27. <i>Ch. jennissejense</i> Aellen et Iljin	69
3558.	28. <i>Ch. prostratum</i> Bge.	69
3559.	29. <i>Ch. Klinggraeffii</i> (Abromeit) Aellen	70
—	*29. <i>Ch. Berlandieri</i> Moq.	70
3560.	30. <i>Ch. serotinum</i> L.	71
—	*30. <i>Ch. hircinum</i> Schrad.	72
—	**30. <i>Ch. quinoa</i> Willd.	72

Genus 401. *Monolepis* Schrad.

3561.	1. <i>M. asiatica</i> Fisch. et Mey.	73
3562.	2. <i>M. Litwinowii</i> Pauls.	74

Tribe 5. *ATRIPLICEAE* C. A. M.

Genus 402. *Spinacia* L.

3563.	1. <i>S. oleracea</i> L.	75
3564.	2. <i>S. turkestanica</i> Iljin	76
3565.	3. <i>S. tetrandra</i> Stev.	77

Genus 403. *Atriplex* L.

Section 1. *Dichrosperma* Dumort.

3566.	1. <i>A. nitens</i> Schkuhr	84
3567.	2. <i>A. hortensis</i> L.	85
3568.	3. <i>A. amblyostegia</i> Turcz.	85

Section 2. *Teutliopsis* Dumort.

3569.	4. <i>A. litoralis</i> L.	86
3570.	5. <i>A. laevis</i> C. A. M.	87
3571.	6. <i>A. patens</i> (Litw.) Iljin	87
3572.	7. <i>A. crassifolia</i> C. A. M.	88
3573.	8. <i>A. patula</i> L.	88
3574.	9. <i>A. oblongifolia</i> W. et K.	89
3575.	10. <i>A. nudicaulis</i> Boguslav.	90
3576.	11. <i>A. Gmelini</i> C. A. M.	90
3577.	12. <i>A. hastata</i> L.	91
3578.	13. <i>A. calotheca</i> (Rafin.) Fries	92
3579.	14. <i>A. heterosperma</i> Bge.	93
3580.	15. <i>A. dimorphostegia</i> Kar. et Kir.	93

Section 3. *Sclerocalymma* Aschers.

3581.	16. <i>A. rosea</i> L.	94
3582.	17. <i>A. sphaeromorpha</i> Iljin	94
3583.	18. <i>A. tatarica</i> L.	95
3584.	19. <i>A. pungens</i> Trautv.	96
3585.	20. <i>A. ornata</i> Iljin	97
3586.	21. <i>A. schugnanica</i> Iljin	97
3587.	22. <i>A. pamirica</i> Iljin	98
3588.	23. <i>A. cana</i> C. A. M.	98
3589.	24. <i>A. megalotheca</i> M. Pop.	101

Section 4. *Obione* C. A. M.

3590.	25. <i>A. centralasiatica</i> Iljin	102
3591.	26. <i>A. sibirica</i> L.	102
3592.	27. <i>A. turcomanica</i> Fisch. et Mey.	103
3593.	28. <i>A. verrucifera</i> M. B.	104
3594.	29. <i>A. thunbergiae</i> Boiss.	105
3595.	30. <i>A. flabellum</i> Bge.	105
3596.	31. <i>A. moneta</i> Bge.	105

Section 5. *Halimus* C. A. M.

3597.	32. <i>A. pedunculata</i> L.	106
3598.	33. <i>A. fera</i> (L.) Bge.	107

Genus 404. *Eurotia* Adans.

3599.	1. <i>E. ceratoides</i> (L.) C. A. M.	108
3600.	2. <i>E. Ewersmanniana</i> Stschegl.	109

Genus 405. *Ceratocarpus* L.

3601.	1. <i>C. arenarius</i> L.	110
3602.	2. <i>C. turkestanicus</i> Sav.-Rycz.	111

Genus 406. *Axyris* L.

3603.	1. <i>A. amaranthoides</i> L.	113
3604.	2. <i>A. hybrida</i> L.	113
3605.	3. <i>A. prostrata</i> L.	114
3606.	4. <i>A. sphaerosperma</i> Fisch. et Mey.	114
3607.	5. <i>A. caucasica</i> (Somm. et Lev.) Lipsky	115

Tribe 6. CAMPHOROSMEAE MOQ.

Genus 407. *Camphorosma* L.

3608.	1. <i>C. monspeliacum</i> L.	117
3609.	2. <i>C. Lessingii</i> Litw.	118
3610.	3. <i>C. annuum</i> Pall.	118
3611.	4. <i>C. songoricum</i> Bge.	119

Genus 408. *Pandertia* Fisch. et Mey.

3612.	1. <i>P. pilosa</i> Fisch. et Mey.	120
3613.	2. <i>P. turkestanica</i> Iljin	120

Genus 409. *Kirilowia* Bge.

3614.	<i>K. eriantha</i> Bge.	123
-------	---------------------------------	-----

Genus 410. *Londesia* Fisch. et Mey.

3615.	<i>L. eriantha</i> Fisch. et Mey.	124
-------	---	-----

Genus 411. *Echinopsilon* Moq.

3616.	1. <i>E. hyssopifolium</i> (Pall.) Moq.	125
3617.	2. <i>E. sedoides</i> (Pall.) Moq.	126
3618.	3. <i>E. divaricatum</i> Kar. et Kir.	126
3619.	4. <i>E. hirsutum</i> (L.) Moq.	127

Genus 412. *Kochia* Roth.

Section 1. *Pterocarpus* Beck.

3620.	1. <i>K. prostrata</i> (L.) Schrad.	128
3621.	2. <i>K. laniflora</i> (S. G. Gmel.) Borb.	130
3622.	3. <i>K. iranica</i> (Hausskn. et Bornm.) Litw.	131
3623.	4. <i>K. Schrenkiana</i> (Moq.) Iljin	132
3624.	5. <i>K. Krylovii</i> Litw.	132
3625.	6. <i>K. melanoptera</i> Bge.	133

Section 2. *Semibassia* Beck.

3626.	7. <i>K. scoparia</i> (L.) Schrad.	133
3627.	8. <i>K. Sieversiana</i> (Pall.) C. A. M.	134

Tribe 7. CORISPERMEAE MOQ.

Genus 413. *Corispermum* L.

3628.	1. <i>C. Marschallii</i> Stev.	138
3629.	2. <i>C. algidum</i> Iljin	139
3630.	3. <i>C. canescens</i> Kit.	140
3631.	4. <i>C. squarrosum</i> L.	140
3632.	5. <i>C. crassifolium</i> Turcz.	143
3633.	6. <i>C. Komarovii</i> Iljin	143

3634.	7. <i>C. aralo-caspicum</i> Iljin	144
3635.	8. <i>C. laxiflorum</i> Schrenk	145
3636.	9. <i>C. nitidum</i> Kit.	145
3637.	10. <i>C. filifolium</i> C. A. M.	145
3638.	11. <i>C. declinatum</i> Steph.	147
3639.	12. <i>C. chinganicum</i> Iljin	147
3640.	13. <i>C. altaicum</i> Iljin	148
3641.	14. <i>C. hyssopifolium</i> L.	148
3642.	15. <i>C. sibiricum</i> Iljin	149
3643.	16. <i>C. Redowskii</i> Fisch.	149
3644.	17. <i>C. erosum</i> Iljin	150
3645.	18. <i>C. Krylovii</i> Iljin	150
3646.	19. <i>C. orientale</i> Lam.	150
3647.	20. <i>C. piliferum</i> Iljin	151
3648.	21. <i>C. mongolicum</i> Iljin	151
3649.	22. <i>C. Lehmanianum</i> Bge.	152
3650.	23. <i>C. heptapotamicum</i> Iljin	152
3651.	24. <i>C. pamiricum</i> Iljin	153
3652.	25. <i>C. tibeticum</i> Iljin	153
3653.	26. <i>C. Hilariae</i> Iljin	154
3654.	27. <i>C. Dutreuilii</i> Iljin	154
3655.	28. <i>C. papillosum</i> (O. Kze.) Iljin	155
3656.	29. <i>C. Korovini</i> Iljin	155
3657.	30. <i>C. gelidum</i> Iljin	156
3658.	31. <i>C. elongatum</i> Bge.	156
3659.	32. <i>C. confertum</i> Bge.	157
3660.	33. <i>C. macrocarpum</i> Bge.	157
3661.	34. <i>C. ulopterum</i> Fenzl	158

Genus 414. *Agriophyllum* M. B.

3662.	1. <i>A. arenarium</i> M. B.	159
3663.	2. <i>A. lateriflorum</i> (Lam.) Moq.	160
3664.	3. <i>A. minus</i> Fisch. et Mey.	161
3665.	4. <i>A. Paletzianum</i> Litw.	161
3666.	5. <i>A. latifolium</i> Fisch. et Mey.	161

Genus 415. *Anthochlamys* Fenzl

3667.	1. <i>A. polygaloides</i> (Fisch. et Mey.) Fenzl	165
3668.	2. <i>A. turcomanica</i> Iljin	165

Tribe 8. SALICORNIEAE DUM.

Genus 416. *Kalidium* Moq.

3669.	1. <i>K. foliatum</i> (Pall.) Moq.	166
3670.	2. <i>K. caspicum</i> (L.) Ung.-Sternb.	167
3671.	3. <i>K. Schrenkianum</i> Bge.	168

Haloepelis Bge.

3672.	1. <i>H. pygmaea</i> (Pall.) Bge.	169
-------	---	-----

Genus 418. *Halostachys* C. A. M.

3673.	1. <i>H. caspica</i> (Pall.) C. A. M.	169
-------	---	-----

Genus 419. *Halocnemum* M. B.

3674.	1. <i>H. strobilaceum</i> (Pall.) M. B.	171
-------	---	-----

Genus 420. *Salicornia* L.

3675.	1. <i>S. herbacea</i> L.	172
-------	----------------------------------	-----

Subfamily 2. *Spirolobeae* C.A.M.

Tribe 9. *SUAEDEAE* RCHB.

Genus 421. *Suaeda* Forsk.

Section 1. *Schanginia* (C.A.M.) Iljin

3676.	1. <i>S. linifolia</i> Pall.	177
3677.	2. <i>S. paradoxa</i> Bge.	178
3678.	3. <i>S. glauca</i> Bge.	178
3679.	4. <i>S. microphylla</i> Pall.	179
3680.	5. <i>S. altissima</i> (L.) Pall.	180

Section 2. *Lachnostigma* Iljin

3681.	6. <i>S. dendroides</i> (C.A.M.) Moq.	181
3682.	7. <i>S. arcuata</i> Bge.	182

Section 3. *Conosperma* Iljin

3683.	8. <i>S. Lypskyi</i> Litw.	183
3684.	9. <i>S. pygmaea</i> (Kar. et Kir.) Iljin	183
3685.	10. <i>S. confusa</i> Iljin	183
3686.	11. <i>S. baccifera</i> Pall.	184
3687.	12. <i>S. acuminata</i> (C.A.M.) Moq.	187
3688.	13. <i>S. pterantha</i> (Kar. et Kir.) Bge.	187
3689.	14. <i>S. transoxana</i> (Bge.) Boiss.	188
3690.	15. <i>S. microsperma</i> (C.A.M.) Fenzl.	188
3691.	16. <i>S. eltonica</i> Iljin	189
3692.	17. <i>S. turkestanica</i> Litw.	189

Section 4. *Physophora* Iljin

3693.	18. <i>S. physophora</i> Pall.	190
-------	--	-----

Section 5. *Heterosperma* Iljin

3694.	19. <i>S. salsa</i> (L.) Pall.	191
3695.	20. <i>S. ussuriensis</i> Iljin	192
3696.	21. <i>S. maritima</i> (L.) Dumort.	193
3697.	22. <i>S. prostrata</i> Pall.	194
3698.	23. <i>S. Olufsenii</i> Pauls.	195
3699.	24. <i>S. corniculata</i> (C.A.M.) Bge.	195
3700.	25. <i>S. drepanophylla</i> Litw.	196
3701.	26. <i>S. heterophylla</i> (Kar. et Kir.) Bge.	197
3702.	27. <i>S. Kossinskyi</i> Iljin	197

Genus 422. *Alexandra* Bge.

3703.	1. <i>A. Lehmanni</i> Bge.	198
-------	------------------------------------	-----

Genus 423. *Borszczowia* Bge.

3704.	1. <i>B. aralocaspica</i> Bge.	199
-------	--	-----

Genus 424. *Binertia* Bge.

3705.	1. <i>B. cycloptera</i> Bge.	200
-------	--------------------------------------	-----

Tribe 10. SALSOLEAE C. A. M.

Genus 425. *Salsola* L.

Section 1: *Kali* (Adans.) Ulbrich

3706.	1. <i>S. ruthenica</i> Iljin	212
3707.	2. <i>S. tragus</i> L.	213
3708.	3. <i>S. kali</i> L.	214
3709.	4. <i>S. collina</i> Pall.	215
3710.	5. <i>S. monoptera</i> Bge.	215
3711.	6. <i>S. praecox</i> Litw.	216
3712.	7. <i>S. Paulseni</i> Litw.	216
3713.	8. <i>S. pellucida</i> Litw.	217
3714.	9. <i>S. Tamamschjanae</i> Iljin	218
3715.	10. <i>S. tamariscina</i> Pall.	218
3716.	11. <i>S. rosacea</i> L.	219
3717.	12. <i>S. soda</i> L.	220
3718.	13. <i>S. mutica</i> C. A. M.	220
3719.	14. <i>S. Komarovii</i> Iljin	221
3720.	15. <i>S. sogdiana</i> Bge.	221
3721.	16. <i>S. aptera</i> Pauls.	222
3722.	17. <i>S. Androssovii</i> Litw.	223
3723.	18. <i>S. deserticola</i> Iljin	223

Section 2. *Physurus* Iljin

3724.	19. <i>S. lanata</i> Pall.	224
3725.	20. <i>S. longistylota</i> Iljin	225
3726.	21. <i>S. kasakorum</i> Iljin	225
3727.	22. <i>S. bucharica</i> Iljin	225
3728.	23. <i>S. crassa</i> M. B.	226
3729.	24. <i>S. subcrassa</i> M. Pop.	229
3730.	25. <i>S. transoxana</i> Iljin	230
3731.	26. <i>S. Korshinskyi</i> Drob.	230
3732.	27. <i>S. aralenais</i> Iljin	231
3733.	28. <i>S. intricata</i> Iljin	231
3734.	29. <i>S. lachnophylla</i> Iljin	232
3735.	30. <i>S. Minkvitziæ</i> Eug. Kor.	232
3736.	31. <i>S. turgaica</i> Iljin	232
3737.	32. <i>S. heptapotamica</i> Iljin	233
3738.	33. <i>S. turcomanica</i> Litw.	234
3739.	34. <i>S. Olgae</i> Iljin	235

Section 3. *Brachyphylla* Iljin

3740.	35. <i>S. affinis</i> C. A. M.	235
-------	--	-----

Section 4. *Heterotricha* Iljin

3741.	36. <i>S. brachiata</i> Pall.	236
-------	---------------------------------------	-----

Section 5. *Anchophyllum* Iljin

3742.	37. <i>S. arbuscula</i> Pall.	237
3743.	38. <i>S. arbusculaeformis</i> Drob.	239
3744.	39. <i>S. laricifolia</i> (Turcz.) Litw.	239
3745.	40. <i>S. montana</i> Litw.	240
3746.	41. <i>S. maracandica</i> Iljin	240
3747.	42. <i>S. chiwensis</i> M. Pcp.	241
3748.	43. <i>S. Richteri</i> Karel.	242
3749.	44. <i>S. Paletzkiiana</i> Litw.	243
3750.	45. <i>S. transhyrcanica</i> Iljin	243
3751.	46. <i>S. Roshevitzii</i> Iljin	244
3752.	47. <i>S. Baranovii</i> Iljin	244

Section 6. *Sphragidanthus* Iljin

3753.	48. <i>S. subaphylla</i> C. A. M.	245
3754.	49. <i>S. glauca</i> M. B.	246
3755.	50. <i>S. hispidula</i> Bge.	247
3756.	51. <i>S. iliensis</i> Lipsky	248

Section 7. *Caroxylon* (Thunb.) Iljin

3757.	52. <i>S. rigida</i> Pall.	251
3758.	53. <i>S. dshungarica</i> Iljin	252
3759.	54. <i>S. laricina</i> Pall.	252
3760.	55. <i>S. nitraria</i> Pall.	253
3761.	56. <i>S. macera</i> Litw.	254
3762.	57. <i>S. incanescens</i> C. A. M.	254
3763.	58. <i>S. dendroides</i> Pall.	255
3764.	59. <i>S. ericoides</i> M. B.	256

Section 8. *Aleuranthus* Iljin

3765.	60. <i>S. scelantha</i> C. A. M.	257
3766.	61. <i>S. carinata</i> C. A. M.	257

Section 9. *Belanthera* Iljin

3767.	62. <i>S. nodulosa</i> (Moq.) Iljin	258
3768.	63. <i>S. gemmascens</i> Pall.	259
3769.	64. <i>S. cana</i> C. Koch	260
3770.	65. <i>S. Aucheri</i> Bge.	261
3771.	66. <i>S. Takhtadshyani</i> Iljin	261
3772.	67. <i>S. stellulata</i> Eug. Kor.	262
3773.	68. <i>S. Vvedenskyi</i> Iljin et M. Pop.	262
3774.	69. <i>S. forcipitata</i> Iljin	263
3775.	70. <i>S. gossypina</i> Bge.	264
3776.	71. <i>S. daghestanica</i> (Turcz.) Lipsky	254

Section 10. *Coccosalsola* Fenzl

3777.	72. <i>S. foliosa</i> (L.) Schrad.	265
-------	--	-----

Genus 426. *Noaea* Moq.

3778.	1. <i>N. mucronata</i> (Forsk.) Asch. et Schweinf.	266
3779.	2. <i>N. leptoclada</i> (Woron.) Iljin	269
3780.	3. <i>N. minuta</i> Boiss. et Bal.	269

Genus 427. *Aellenia* Ulbrich

3781.	1. <i>A. auricula</i> (Moq.) Ulbrich	270
-------	--	-----

Genus 428. *Rhaphidophyton* Iljin

3782.	1. <i>R. Regelii</i> (Bge.) Iljin	271
-------	---	-----

Genus 429. *Horaninowia* Fisch. et Mey.

3783.	1. <i>H. anomala</i> (C. A. M.) Moq.	272
3784.	2. <i>H. minor</i> Fisch. et Mey.	273
3785.	3. <i>H. ulicina</i> Fisch. et Mey.	274
3786.	4. <i>H. excellens</i> Iljin	274

Genus 430. *Seidlitzia* Bge.

3787.	1. <i>S. rosmarinus</i> (Ehrh.) Bge.	275
3788.	2. <i>S. florida</i> (M. B.) Boiss.	276

Genus 431. *Ofaiston* Rafin.

3789.	1. <i>O. monandrum</i> (Pall.) Moq.	276
-------	---	-----

Genus 432. *Girgensohnia* Bge.

3790.	1. <i>G. oppositiflora</i> (Pall.) Fenzl	277
3791.	2. <i>G. minima</i> Eug. Kor.	278
3792.	3. <i>G. diptera</i> Bge.	281

Genus 433. *Anabasis* L.

Section 1. *Setifera* Ulbrich

3793.	1. <i>A. micradena</i> Iljin	284
-------	--	-----

Section 2. *Adenophora* Iljin

3794.	2. <i>A. Pelliotii</i> P. Danguy	285
3795.	3. <i>A. turgaica</i> Iljin	286
3796.	4. <i>A. affinis</i> Fisch. et Mey.	286
3797.	5. <i>A. Abolini</i> Iljin	287
3798.	6. <i>A. brevifolia</i> C. A. M.	287

Section *chylepis* (C. A. M.) Bge.

3799.	7. <i>A. salsa</i> (C. A. M.) Benth.	288
3800.	8. <i>A. ramosissima</i> Minkw.	289
3801.	9. <i>A. eriopoda</i> (C. A. M.) Benth.	290

Section 4. *Euanabasis* Bge.

3802.	10. <i>A. ferganica</i> Drob.	291
3803.	11. <i>A. turkestanica</i> Eug. Kor.	292
3804.	12. <i>A. brachiata</i> Fisch. et Mey.	292
3805.	13. <i>A. cretacea</i> Pall.	295
3806.	14. <i>A. macroptera</i> Moq.	296
3807.	15. <i>A. truncata</i> (Schrenk) Bge.	296
3808.	16. <i>A. aphylla</i> L.	297
3809.	17. <i>A. balchaschensis</i> Iljin	299
3810.	18. <i>A. pauciflora</i> M. Pop.	299
3811.	19. <i>A. gypsicola</i> Iljin	299

3812.	20. <i>A. elatior</i> (C. A. M.) B. Schischk.	300
3813.	21. <i>A. Korovini</i> Iljin	300
3814.	22. <i>A. jaxartica</i> (Bge.) Benth.	301
3815.	23. <i>A. hispidula</i> (Bge.) Benth.	301

Genus 434. *Arthrophytum* Schrenk

Section 1. *Ammodiendroides* Iljin

3816.	1. <i>A. iliense</i> Iljin	303
-------	--------------------------------------	-----

Section 2. *Euarthrophytum* Iljin

3817.	2. <i>A. Lehmannianum</i> Bge.	304
3818.	3. <i>A. subulifolium</i> Schrenk	306
3819.	4. <i>A. Litwinowii</i> Eug. Kor.	306
3820.	5. <i>A. betpakdalense</i> Eug. Kor.	307
3821.	6. <i>A. leptocladum</i> M. Pop.	308
3822.	7. <i>A. wakhanicum</i> (Pauls.) Eug. Kor.	308

Genus 435. *Iljinia* Eug. Kor.

3823.	1. <i>I. Regelii</i> (Bge.) Eug. Kor.	308
-------	---	-----

Genus 436. *Haloxylon* Bge.

3824.	1. <i>H. persicum</i> Bge.	311
3825.	2. <i>H. aphyllum</i> (Minkv.) Iljin	312
3826.	3. <i>H. ammodendron</i> Bge.	313

Genus 437. *Nanophyton* Less.

3827.	1. <i>N. erinaceum</i> (Pall.) Bge.	314
-------	---	-----

Genus 438. *Petrosimonia* Bge.

Section 1. *Oligandra* Iljin

3828.	1. <i>P. monandra</i> (Pall.) Bge.	317
3829.	2. <i>P. triandra</i> (Pall.) Simonkai	318
3830.	3. <i>P. Litwinowii</i> Korsh.	319

Section 2. *Sinandra* Iljin

3831.	4. <i>P. crassifolia</i> (Pall.) Bge.	319
3832.	5. <i>P. glaucescens</i> (Bge.) Iljin	323
3833.	6. <i>P. brachyphylla</i> (Bge.) Iljin	323
3834.	7. <i>P. hirsutissima</i> (Bge.) Iljin	323
3835.	8. <i>P. glauca</i> (Pall.) Bge.	324
3836.	9. <i>P. squarrosa</i> (Schrenk) Bge.	325

Section 3. *Brachyphyllon* Iljin

3837.	10. <i>P. brachiata</i> (Pall.) Bge.	325
3838.	11. <i>P. sibirica</i> (Pall.) Bge.	326

Genus 439. *Halocharis* Moq.

3839.	1. <i>H. hispida</i> (C. A. M.) Bge.	327
3840.	2. <i>H. turcomanica</i> Iljin	328
3841.	3. <i>H. lachnantha</i> Eug. Kor.	329

Genus 440. *Halimocnemis* C. A. M.

3842.	1. <i>H. Karelini</i> Moq.	331
3843.	2. <i>H. sclerosperma</i> (Pall.) C. A. M.	332
3844.	3. <i>H. villosa</i> Kar. et Kir.	333
3845.	4. <i>H. longifolia</i> Bge.	333
3846.	5. <i>H. Beresini</i> Iljin	334
3847.	6. <i>H. mollissima</i> Bge.	334
3848.	7. <i>H. glaberrima</i> Iljin	335
3849.	8. <i>H. lasiantha</i> Iljin	336
3850.	9. <i>H. macranthera</i> Bge.	336
3851.	10. <i>H. Smirnovii</i> Bge.	337
3852.	11. <i>H. latifolia</i> Iljin	338

Genus 441. *Halotis* Bge.

3853.	1. <i>H. pilosa</i> (Moq.) Iljin	339
-------	--	-----

Genus 442. *Piptoptera* Bge.

3854.	1. <i>P. turkestanica</i> Bge.	340
-------	--	-----

Genus 443. *Halanthium* C. Koch

3855.	1. <i>H. rariflorum</i> C. Koch	343
3856.	2. <i>H. ku pianum</i> (C. Koch) Bge.	344
3857.	3. <i>H. roseum</i> (Trautv.) Iljin	345
3858.	4. <i>H. Lipskyi</i> Pauls.	345

Genus 444. *Gamanthus* Bge.

3859.	1. <i>G. gamocarpus</i> (Moq.) Bge.	347
3860.	2. <i>G. kelifi</i> Eug. Kor.	348
3861.	3. <i>G. pilosus</i> (Pall.) Bge.	348
3862.	4. <i>G. ferganicus</i> Iljin	349

Genus 445. *Cornulaca* Del.

3863.	1. <i>Korshinskyi</i> Litw.	350
-------	-------------------------------------	-----

Genus 446. *Halogeton* C. A. M.

Section 1. *Euhalogeton* Fenzl.

3864.	1. <i>H. glomeratus</i> C. A. M.	351
3865.	2. <i>H. tibeticus</i> Bge.	352

Section 2. *Micropeplis* Bge.

3866.	3. <i>H. arachnoideus</i> Moq.	352
-------	--	-----

Genus 447. *Sympegma* Bge.

3867.	1. <i>S. Regeli</i> Bge.	353
-------	----------------------------------	-----

Family **LIV. Amaranthaceae** Juss.

Genus * *Celosia* L.

—	*1. <i>C. argentea</i> L.	355
—	*2. <i>C. cristata</i> L.	356

Genus 448. *Amaranthus* L.

3868.	1. <i>A. caudatus</i> L.	Стр. 360
3869.	2. <i>A. leucospermus</i> S. Wats.	350
3870.	3. <i>A. paniculatus</i> L.	361
3871.	4. <i>A. retroflexus</i> L.	362
3872.	5. <i>A. blitoides</i> S. Wats.	363
3873.	6. <i>A. tricolor</i> L.	363
3874.	7. <i>A. albus</i> L.	363
3875.	8. <i>A. blitum</i> L.	364
3876.	9. <i>A. graecizans</i> L.	365
3877.	10. <i>A. Thellungianus</i> Nevski	365
3878.	11. <i>A. deflexus</i> L.	366
3879.	12. <i>A. lividus</i> L.	366

Genus 449. *Achyranthes* L.

3880.	1. <i>A. bidentata</i> Blume	367
-------	--	-----

Genus 450. *Alternanthera* Forsk.

3881.	1. <i>A. sessilis</i> (L.) R. Br.	368
-------	---	-----

Genus 451. *Gomphrena* L.

3882.	1. <i>G. globosa</i> L.	369
-------	---------------------------------	-----

Family **LV. Nyctaginaceae** Lindl.Genus 452. *Mirabilis*

3883.	1. <i>M. nyctaginea</i> (Mich.) Mac. Millan	371
-------	---	-----

Family **LVI. Thelygonaceae** Eichl.Genus 453. *Thelygonum* L.

3884.	1. <i>T. cynocrambe</i> L.	372
-------	------------------------------------	-----

Family **LVII. Phytolaccaceae** Lindl.Genus 454. *Phytolacca* L.

3885.	1. <i>P. americana</i> L.	373
-------	-----------------------------------	-----

Family **LVIII. Aizoaceae** A. Br.Genus 455. *Mollugo* L.

3886.	1. <i>M. cerviana</i> (L.) Ser.	374
-------	---	-----

Genus 456. *Glinus* Loebl.

3887.	<i>G. lotoides</i> L.	374
-------	-------------------------------	-----

Genus 457. *Aizoon* L.

3888.	<i>A. hispanicum</i> L.	375
-------	---------------------------------	-----

Family **LIX. Portulacaceae** Lindl.Genus 458. *Claytonia* Gronov.Section 1. *Cormosae* A. Gray.

3889.	1. <i>C. tuberosa</i> Pall.	378
-------	-------------------------------------	-----

Section 2. Caudicosae A. Gray.

3890.	2. <i>C. acutifolia</i> Pall.	378
3891.	3. <i>C. arctica</i> Adams.	381
3892.	4. <i>C. Joanneana</i> Roem. et Schult.	381
3893.	5. <i>C. Eschscholtzii</i> Cham.	382

Section 3. Rhizomatosae A. Gray.

3894.	6. <i>C. sarmentosa</i> C. A. M.	382
-------	--	-----

Section 4. Microclaytonia Kuzen.

3895.	7. <i>C. Vassilievii</i> Kuzen.	383
-------	---	-----

Section 5. *Limnia propria* A. Gray

3896.	8. <i>C. sibirica</i> L.	383
-------	----------------------------------	-----

Genus 459. *Montia* Mich.

3897.	1. <i>M. minor</i> Gmel.	384
3898.	2. <i>M. lamprosperma</i> Cham.	385
3899.	3. <i>M. rivularis</i> Gmel.	385

Genus 460. *Portulaca* L.

3900.	1. <i>P. oleracea</i> L.	386
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Family LX. *Caryophyllaceae* Juss.

Subfamily I *Alsinoideae* Vierh.

Tribe 1. *ALSINEAE* PAX.

Genus 461. *Stellaria* L.

Section 1. *Eustellaria* Fenzl

3901.	1. <i>S. nemorum</i> L.	394
3902.	2. <i>S. Bungeana</i> Fenzl	395
3903.	3. <i>S. media</i> (L.) Cyr.	395
3904.	4. <i>S. neglecta</i> Weihe	396
3905.	5. <i>S. pallida</i> (Dumort.) Piré	397
3906.	6. <i>S. dichotoma</i> L.	397
3907.	7. <i>S. karatavica</i> (Lipsch.) Schischk.	398
3908.	8. <i>S. amblyosepala</i> Schrenk	398
3909.	9. <i>S. turkestanica</i> Schischk.	401
3910.	10. <i>S. holostea</i> L.	402
3911.	11. <i>S. crassifolia</i> Ehrh.	403
3912.	12. <i>S. humifusa</i> Roth.	402
3913.	13. <i>S. Winkleri</i> (Briq.) Schischk.	403
3914.	14. <i>S. ebracteata</i> Kom.	404
3915.	15. <i>S. calycantha</i> (Ldb.) Bong.	404
3916.	16. <i>S. graminea</i> L.	404
3917.	17. <i>S. jaluana</i> Nakai	405
3918.	18. <i>S. b achypetala</i> Bge.	405
3919.	19. <i>S. imbricata</i> Bge.	406
3920.	20. <i>S. palustris</i> Ehrh.	406

3921.	21. <i>S. persica</i> Boiss.	407
3922.	22. <i>S. fontana</i> M. Pop.	407
3923.	23. <i>S. hebecalyx</i> Fenzl	408
3924.	24. <i>S. discolor</i> Turcz.	408
3925.	25. <i>S. umbellata</i> Turcz.	409
3926.	26. <i>S. irrigua</i> Bge.	409
3927.	27. <i>S. alsine</i> Grimm.	409
3928.	28. <i>S. anagalloides</i> C. A. M.	410
3929.	29. <i>S. diffusa</i> Willd.	410
3930.	30. <i>S. Fenzlii</i> Rgl.	411
3931.	31. <i>S. peduncularis</i> Bge.	411
3932.	32. <i>S. soongorica</i> Roshev.	412
3933.	33. <i>S. ciliatosepala</i> Trautv.	415
3934.	34. <i>S. Edwardsii</i> R. Br.	415
3935.	35. <i>S. dahurica</i> Willd.	415
3936.	36. <i>S. Laxmanni</i> Fisch.	416
3937.	37. <i>S. ruscifolia</i> Pall.	417
3938.	38. <i>S. Eschscholtziana</i> Fenzl	417
3939.	39. <i>S. Fischeriana</i> Ser.	417
3940.	40. <i>S. arctica</i> Schischk.	418

Section 2. *Fimbripetalum* Turcz.

3941.	41. <i>S. radians</i> L.	418
-------	----------------------------------	-----

Section 3. *Adenonema* (Bge.) Fenzl

3942.	42. <i>S. petraea</i> Bge.	419
3943.	43. <i>S. Cherleriae</i> (Fisch.) Williams	420
3944.	44. <i>S. sibirica</i> (Rgl. et Til.) Schischk.	420
3945.	45. <i>S. dicranoides</i> Fenzl	421

Section 4. *Leucostemma* (Benth.) Fenzl

3946.	46. <i>S. Martjanovii</i> Kryl.	421
-------	---	-----

Section 5. *Oligosperma* Boiss.

3947.	47. <i>S. Kotschyana</i> Fenzl	422
3948.	48. <i>S. schugnanica</i> Schischk.	422
3949.	49. <i>S. Alexeenkoana</i> Schischk.	422

Section 6. *Pseudalsine* Boiss.

3950.	50. <i>S. alsinoides</i> Boiss. et Buhse	423
-------	--	-----

Genus 462. *Krascheninnikowia* Turcz.

3951.	1. <i>K. silvatica</i> Maxim.	424
3952.	2. <i>K. rigida</i> Kom.	425
3953.	3. <i>K. japonica</i> Korsh.	425
3954.	4. <i>K. Davidi</i> Franch.	426
3955.	5. <i>K. rupestris</i> Turcz.	426
3956.	6. <i>K. Maximowicziana</i> Franch. et Sav.	429

Genus 463. *Malachium* Fries.

3957.	1. <i>M. aquaticum</i> (L.) Fries	430
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Genus 464. *Cerastium* L.

Подрод 1. *Dichodon* (Bartl.) Fenzl

3958.	1. <i>C. cerastoides</i> (L.) Britt.	435
3959.	2. <i>C. anomalum</i> Waldst. et Kit.	436

Subgenus 2. *Eucerastium* (Boiss.) Pax

Section 1. *Strephodon* Ser.

3960.	3. <i>C. pauciflorum</i> Stev.	439
3961.	4. <i>C. falcatum</i> Bge.	439
3962.	5. <i>C. maximum</i> L.	440
3963.	6. <i>C. undulatifolium</i> Som. et Lev.	440
3964.	7. <i>C. lithospermifolium</i> Fisch.	441
3965.	8. <i>C. kasbek</i> Parrot	441
3966.	9. <i>C. multilorum</i> C. A. M.	442
3967.	10. <i>C. microspermum</i> C. A. M.	442
3968. *	11. <i>C. armeniacum</i> Gren.	443
3969.	12. <i>C. holosteu</i> m Fisch.	443
3970.	13. <i>C. nemorale</i> M. B.	444
3971.	14. <i>C. dahuricum</i> Fisch.	444
3972.	15. <i>C. hemschianicum</i> Schischk.	445
3973.	16. <i>C. oreades</i> Schischk.	445
3974.	17. <i>C. perfoliatum</i> L.	446
3975.	18. <i>C. chlorifolium</i> Fisch. et Mey.	446

Section 2. *Schizodon* (Fenzl) Schischk.

3976.	19. <i>C. dichotomum</i> L.	447
3977	20. <i>C. inflatum</i> Link	447

Section 3. *Orthodon* Ser.

3978.	21. <i>C. longifolium</i> Willd.	448
3979.	22. <i>C. rudera</i> le M. B.	449
3980.	23. <i>C. tauricum</i> Sereng.	449
3981.	24. <i>C. glomeratum</i> Thuill.	450
3982.	25. <i>C. semidecandrum</i> L.	450
3983.	26. <i>C. dentatum</i> Möschl.	451
3984.	27. <i>C. Alexeenkoanum</i> Schischk.	451
3985.	28. <i>C. glutinosum</i> Fries	452
3986.	29. <i>C. Schmalhauseni</i> Pacz.	452
3987.	30. <i>C. Meyerianum</i> Rupr.	453
3988.	31. <i>C. purpurascens</i> Adams	453
3989.	32. <i>C. furcatum</i> Cham.	454
3990.	33. <i>C. caespitosum</i> Gilib.	455
3991.	34. <i>C. tianschanicum</i> Schischk.	456
3992.	35. <i>C. Beeringianum</i> Cham. et Schlecht	456
3993.	36. <i>C. Gorodkovianum</i> Schischk.	457
3994.	37. <i>C. Fischerianum</i> Ser.	457
3995.	38. <i>C. pusillum</i> Ser.	457
3996.	39. <i>C. alpinum</i> L.	458
3997.	40. <i>C. Regelii</i> Ostenf.	458
3998.	41. <i>C. Bialynickii</i> Tolm.	459
3999.	42. <i>C. polymorphum</i> Rupr.	459

4000.	43. <i>C. arvense</i> L.	460
4001.	44. <i>C. Biebersteini</i> DC.	463
4002.	45. <i>C. argenteum</i> M. B.	464
4003.	46. <i>C. Sosnowskyi</i> Schischk.	464
4004.	47. <i>C. Szowitsii</i> Boiss.	465
4005.	48. <i>C. dagestanicum</i> Schischk.	465
4006.	49. <i>C. ponticum</i> Alb.	465
4007.	50. <i>C. Stevenii</i> Schischk.	466

Genus 465. *Holosteum* L.

4008.	1. <i>H. umbellatum</i> L.	467
4009.	2. <i>H. glutinosum</i> (M. B.) Fisch. et Mey.	467
4010.	3. <i>H. marginatum</i> C. A. M.	468

Genus 466. *Sagina* L.

Section 1. *Spergella* Rchb.

4011.	1. <i>S. nodosa</i> (L.) Fenzl	472
4012.	2. <i>S. saginoides</i> (L.) Dalla Torre	472
4013.	3. <i>S. maxima</i> A. Gray	473
4014.	4. <i>S. litoralis</i> Hultén	473

Section 2. *Saginella* Koch

4015.	5. <i>S. procumbens</i> L.	474
4016.	6. <i>S. apetala</i> Arduino	474
4017.	7. <i>S. nivalis</i> (Lindbl.) Fries	475
4018.	8. <i>S. oxysepala</i> Boiss.	475

Genus 467. *Buffonia* L.

4019.	1. <i>B. macrocarpa</i> Ser.	476
4020.	2. <i>B. parviflora</i> Griseb.	476
4021.	3. <i>B. Oliveriana</i> Ser.	479

Genus 468. *Lepyrodiclis* Fenzl

4022.	1. <i>L. holosteoides</i> (C. A. M.) Fisch. et Mey.	480
4023.	2. <i>L. stellarioides</i> Schrenk	481

Genus 469. *Queria* Loeffl.

4024.	1. <i>Q. hispanica</i> L.	
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Genus 470. *Minuartia* L.

Section 1. *Sabulina* (Rchb.) Asch. et Gr.

4025.	1. <i>M. turcomanica</i> Schischk.	487
4026.	2. <i>M. viscosa</i> (Schreb.) Schinz et Thell.	487
4027.	3. <i>M. hybrida</i> (Vil.) Schischk.	488
4028.	4. <i>M. Regeliana</i> (Trautv.) Mattf.	488

Section 2. *Euminuartia* (Fenzl) Graebn.

4029.	5. <i>M. Meyeri</i> (Boiss.) Bornm.	489
4030.	6. <i>M. Akinfiewii</i> (Schmalh.) Woron.	490
4031.	7. <i>M. Wiesneri</i> (Stapf) Schischk.	490
4032.	8. <i>M. intermedia</i> (Boiss.) Hand.-Mazz.	491
4033.	9. <i>M. sclerantha</i> (Fisch. et Mey.)	491

4034.	10. <i>M. glomerata</i> (M. B.) Degen	492
4035.	11. <i>M. setacea</i> (Thuill.) Hayek	492
4036.	12. <i>M. Krascheniannikovii</i> Schischk.	493
4037.	13. <i>M. Buschiana</i> Schischk.	493
4038.	14. <i>M. micrantha</i> Schischk.	494
4039.	15. <i>M. granuiflora</i> (Fenzl) Grossh.	494
4040.	16. <i>M. Woronowii</i> Schischk.	495
4041.	17. <i>M. adenotricha</i> Schischk.	495
4042.	18. <i>M. abchasica</i> Schischk.	495
4043.	19. <i>M. hirsuta</i> (M. B.) Hand.-Mazz.	496
4044.	20. <i>M. oreina</i> (Mattf.) Schischk.	499

Section 3. *Lanceolatae* Fenzl

4045.	21. <i>M. dianthifolia</i> (Boiss.) Hand.-Mazz.	499
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Section 4. *Acutiflorae* Fenzl

4046.	22. <i>M. Biebersteinii</i> (Rupr.) Schischk.	500
4047.	23. <i>M. Helmii</i> (Fisch.) Schischk.	501
4048.	24. <i>M. Kryloviana</i> Schischk.	501
4049.	25. <i>M. jacutica</i> Schischk.	502
4050.	26. <i>M. gracilipes</i> (Kom.) Schischk.	502
4051.	27. <i>M. lineata</i> (C. A. M.) Bornm.	503
4052.	28. <i>M. taurica</i> (Stev.) Asch. et Graebn.	503
4053.	29. <i>M. Litwinowii</i> Schischk.	504

Section 5. *Poly mechana* Mattf.

4054.	30. <i>M. verna</i> (L.) Hiern.	505
4055.	31. <i>M. rubella</i> (Whlb.) Graebn.	506
4056.	32. <i>M. orthotrichoides</i> Schischk.	506

Section 6. *Alsianthe* Fenzl

4057.	33. <i>M. stricta</i> (Sw.) Hiern.	507
4058.	34. <i>M. elegans</i> (Cham. et Schlecht.) Schischk.	508
4059.	35. <i>M. pusilla</i> Schischk.	508

Section 7. *Spectabiles* Fenzl

4060.	36. <i>M. aizoides</i> (Boiss.) Bornm.	509
4051.	37. <i>M. caucasica</i> (Ad.) Mattf.	509
4062.	38. <i>M. laricina</i> (L.) Mattf.	513
4063.	39. <i>M. macrocarpa</i> (Pursh) Ostenf.	513
4064.	40. <i>M. imbricata</i> (M. B.) Woron.	514
4065.	41. <i>M. rhodocalyx</i> (Alb.) Woron.	514
4066.	42. <i>M. Brotherana</i> (Trautv.) Woron.	515
4067.	43. <i>M. arctica</i> (Stev.) Asch. et Gr.	515
4068.	44. <i>M. biflora</i> (L.) Schinz et Thell.	516

Genus 471. *Ammodenia* Patrin

4069.	1. <i>A. peploides</i> (L.) Rupr.	517
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Genus 472. *Arenaria* L

Subgenus ¹ *Eremogone* Fenzl

4070.	1. <i>A. dianthoides</i> Sm.	520
4071.	2. <i>A. cephalotes</i> M. B.	521

4072.	3. <i>A. rigida</i> M. B.	521
4073.	4. <i>A. holostea</i> M. B.	522
—	*5. <i>A. Szovitsii</i> Boiss.	522
4074.	6. <i>A. macrantha</i> Schischk.	522
4075.	7. <i>A. Koriniana</i> Fisch.	525
4076.	8. <i>A. graminifolia</i> Schrad.	525
4077.	9. <i>A. polaris</i> Schischk.	526
4078.	10. <i>A. graminea</i> C. A. M.	526
4079.	11. <i>A. Steveniana</i> Boiss.	527
4080.	12. <i>A. asiatica</i> Schischk.	527
4081.	13. <i>A. longifolia</i> M. B.	527
4082.	14. <i>A. gypsophiloides</i> L.	528
4093.	15. <i>A. cucubaloides</i> Smith.	528
4084.	16. <i>A. juncea</i> M. B.	529
4085.	17. <i>A. formosa</i> Fisch.	529
4086.	18. <i>A. lychnidea</i> M. B.	530
4087.	19. <i>A. capillaris</i> Poir.	530
4088.	20. <i>A. mongolica</i> Schischk.	531
4089.	21. <i>A. Meyeri</i> Fenzl	531
4090.	22. <i>A. tschuktschorum</i> Rgl.	532
4091.	23. <i>A. ferganica</i> Schischk.	532
4092.	24. <i>A. insignis</i> Litw.	535
—	24. <i>A. Ledebouriana</i> Fenzl	535
4093.	26. <i>A. Paulsenii</i> H. Winkler	535
4094.	27. <i>A. Griffithii</i> Boiss.	535

Subgenus 2. *Monogone* (Maxim.) Schischk.

4095.	28. <i>A. Potaninii</i> Schischk.	535
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Subgenus 3. *Euthalia* Fenzl

4096.	29. <i>A. humifusa</i> (Swartz) Whlb.	537
4097.	30. <i>A. pseudofrigida</i> (Ostenf. et Dahl) Juz.	537
4098.	31. <i>A. Redowskii</i> Cham. et Schlecht.	538
4099.	32. <i>A. rotundifolia</i> M. B.	538
4100.	33. <i>A. turkestanica</i> Schischk.	538
4101.	34. <i>A. serpyllifolia</i> L.	539
4102.	35. <i>A. leptoclados</i> Guss.	539

Genus 473. *Moehringia* L.

4103.	1. <i>M. trinervia</i> (L.) Clairv.	540
4104.	2. <i>M. lateriflora</i> (L.) Fenzl	541
4105.	3. <i>M. elongata</i> Schischk.	541
4106.	4. <i>M. umbrosa</i> (Bge.) Fenzl	542

Genus 474. *Merckia* Fisch.

4107.	1. <i>M. physodes</i> (DC.) Fisch.	545
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Genus 475. *Thylacospermum* Fenzl

4108.	1. <i>T. caespitosum</i> (Camb.) Schischk.	546
-------	--	-----

Tribe 2. SCLERANTHEAE VIERH.

Genus 476. *Scleranthus* L.

Subgenus *Euscleranthus* Pax.

4109.	1. <i>S. perennis</i> L.	547
4110.	2. <i>S. annuus</i> L.	547
4111.	3. <i>S. polycarpus</i> L.	548
4112.	4. <i>S. uncinatus</i> Schur.	548

Subfamily 2. *Paronychioideae* Vierh.

Tribe 1. SPERGULEAE VIERH.

Genus 477. *Spergula* L.

4113.	1. <i>S. vulgaris</i> Boenningh.	551
4114.	2. <i>S. sativa</i> Boenningh.	551
4115.	3. <i>S. maxima</i> Weihe	552
4116.	4. <i>S. linicola</i> Boreau	552
4117.	5. <i>S. vernalis</i> Willd.	555
4118.	6. <i>S. pentandra</i> L.	555

Genus 478. *Spergularia* (Pers.) J. et C. Presl

4119.	1. <i>S. marginata</i> (DC.) Kitt.	557
4120.	2. <i>S. diandra</i> (Guss.) Heldr. et Sart.	557
4121.	3. <i>S. campestris</i> (L.) Aschers.	558
4122.	4. <i>S. salina</i> J. et C. Presl	561

Genus 479. *Alsine* L.

4123.	1. <i>A. segetalis</i> L.	562
-------	-----------------------------------	-----

Tribe 2. TELEFIEAE DC.

Genus 480. *Telefium* L.

4124.	1. <i>T. orientale</i> Boiss.	563
4125.	2. <i>T. oligospermum</i> Steud.	563

Tribe 3. POLYCARPEAE DC.

Род 481. *Polycarpon* Loeffl.

4126.	1. <i>P. tetraphyllum</i> L.	564
-------	--------------------------------------	-----

Tribe 4. PARONYCHIEAE PAX.

Genus 482. *Paronychia* Adans.

Section 1. *Eunychia* DC.

4127.	1. <i>P. cephalotes</i> (M. B.) Bess.	565
4128.	2. <i>P. kurdica</i> Boiss.	556

Genus 483. *Herniaria* L.

Section 1. *Euherniaria* Williams

4129.	1. <i>H. glabra</i> L.	567
4130.	2. <i>H. caucasica</i> Rupr.	567
4131.	3. <i>H. incana</i> Lam.	568
4132.	4. <i>H. hirsuta</i> L.	571

Section 2. *Paronychiella* Williams

4133. 5. *H. polygama* J. Gay 571

Tribe 5. *PTERANTHEAE* ENDL.

Genus 484. *Pteranthus* Forsk.

4134. 1. *P. dichotomus* Forsk. 572

Subfamily 3. *Silenoideae* A. Br.

Tribe 1. *LYCHNIDEAE* A. Br.

Genus 485. *Agrostemma* L.

4135. 1. *A. githago* L. 575

4136. 2. *A. linicola* Terech. 575

Genus 486. *Viscaria* Roehl.

Section 1. *Euviscaria* Nyman

4137. 1. *V. viscosa* (Scop.) Aschers. 576

Section 2. *Liponeurum* Nyman

4138. 2. *V. alpina* (L.) G. Don. 577

Genus 487. *Silene* L.

Subgenus 1. *Behen* (Moench) Bge.

4139. 1. *S. latifolia* (Mill.) Rendle et Brit. 596

4140. 2. *S. commutata* Guss. 597

4141. 3. *S. uniflora* Roth. 597

4142. 4. *S. Cserei* Baumg. 598

4143. 5. *S. procumbens* Murr. 601

4144. 6. *S. multifida* (Ad.) Rohrb. 601

4145. 7. *S. lacera* (Stev.) Sims. 602

Subgenus 2. *Eusilene* (Rohrb.) Pax

Section 1. *Odontopetalae* Schischk.

4146. 8. *S. oreina* Schischk. 603

4147. 9. *S. turcomanica* Schischk. 603

4148. 10. *S. samarkandensis* Preobr. 604

4149. 11. *S. conformifolia* Preobr. 604

4150. 12. *S. Michelsoni* Preobr. 605

4151. 13. *S. adenopetala* H. Raic. 605

4152. 14. *S. Raddeana* Trautv. 605

4153. 15. *S. physocalyx* Ldb. 606

- 16. *S. artwinensis* Schischk. 606

4154. 17. *S. lazica* Boiss. 609

4155. 18. *S. commelinifolia* Boiss. 609

Section 2. *Cinninnoisilene* Rohrb.

4156. 19. *S. dichotoma* Ehrh. 610

4157. 20. *S. iberica* M. B. 610

4158. 21. *S. talyschensis* Schischk. 611

4159. 22. *S. Thirkeana* C. Koch 611

4160. 23. *S. euxina* Rupr. 612

4161.	24. <i>S. anglica</i> L.	612
4162.	25. <i>S. brachypetala</i> Rob. et Cast.	613
4163.	26. <i>S. pendula</i> L.	614
4164.	27. <i>S. apetala</i> Willd.	614

Section 3. *Compactae* Boiss.

4165.	28. <i>S. compacta</i> Fisch.	615
4166.	29. <i>S. armeria</i> L.	615

Section 4. *Chloranthae* Rohrb.

4167.	30. <i>S. chlorantha</i> (Willd.) Ehrh.	616
4168.	31. <i>S. multiflora</i> (Ehrh.) Pers.	617
4169.	32. <i>S. Gawrilowii</i> Krasn.	617
4170.	33. <i>S. balchaschensis</i> Schischk.	618
4171.	34. <i>S. glaucescens</i> Schischk.	618
4172.	35. <i>S. lithophila</i> Kar. et Kir.	618
4173.	36. <i>S. tatarica</i> (L.) Pers.	619
4174.	37. <i>S. praemixta</i> M. Pop.	620
4175.	38. <i>S. daghestanica</i> Rupr.	620
4176.	39. <i>S. chloropetala</i> Rupr.	623
4177.	40. <i>S. eremilica</i> Boiss.	623
4178.	41. <i>S. macrostyla</i> Maxim.	624
4179.	42. <i>S. koreana</i> Kom.	624
4180.	43. <i>S. foliosa</i> Maxim.	625
4181.	44. <i>S. graminifolia</i> Otth	625
4182.	45. <i>S. chamarensis</i> Turcz.	626
4183.	46. <i>S. paucifolia</i> Ldb.	626
4184.	47. <i>S. stenophylla</i> Ldb.	627
4185.	48. <i>S. jennisseensis</i> Willd.	627

Section 5. *Nanosilene* Otth

4186.	49. <i>S. acaulis</i> L.	628
4187.	50. <i>S. dianthoides</i> Pers.	629
4188.	51. <i>S. Marcowizii</i> Schischk.	630
4189.	52. <i>S. rupestris</i> L.	630

Section 6. *Lasiostemones* Boiss.

4190.	53. <i>S. Ruprechtii</i> Schischk.	631
4191.	54. <i>S. lasiantha</i> C. Koch	631
4192.	55. <i>S. Marschallii</i> C. A. M.	635
4193.	56. <i>S. propinqua</i> Schischk.	635
4194.	57. <i>S. gasimailikensis</i> B. Fedtsch.	636

Section 7. *Sclerocalycinae* Boiss.

4195.	58. <i>S. longiflora</i> Ehrh.	636
4196.	59. <i>S. bupleroides</i> L.	637
4197.	60. <i>S. Litwinowii</i> Schischk.	637
4198.	61. <i>S. tachtensis</i> Franch.	638
4199.	62. <i>S. solenantha</i> Trautv.	638
4200.	63. <i>S. armena</i> Boiss.	639
4201.	64. <i>S. longidens</i> Schischk.	639
4202.	65. <i>S. tenella</i> C. A. M.	639

4203.	66. <i>S. chlorifolia</i> Sm.	640
4204.	67. <i>S. swertiifolia</i> Boiss.	641
4205.	68. <i>S. odoratissima</i> Bge.	641
4206.	69. <i>S. Olgiana</i> B. Fedtsch.	541
4207.	70. <i>S. anisoloba</i> Schrenk	642
4208.	71. <i>S. plurifolia</i> Schischk.	642
4209.	72. <i>S. baldshuanica</i> B. Fedtsch.	643
4210.	73. <i>S. bucharica</i> M. Pop.	643
4211.	74. <i>S. Kudrjaschewii</i> Schischk.	644
4212.	75. <i>S. obtusidentata</i> B. Fedtsch.	644
4213.	76. <i>S. sarawschanica</i> Rgl.	645
4214.	77. <i>S. leptocaulis</i> Schischk.	645

Section 8. *Suffruticosae* Rohrb.

4215.	78. <i>S. altaica</i> Pers.	646
4216.	79. <i>S. Alexandrae</i> Keller	646
4217.	80. <i>S. cretacea</i> Fisch.	647
4218.	81. <i>S. suffrutescens</i> M. B.	647

Section 9. *Tomentellae* Schischk

219.	82. <i>S. tomentella</i> Schischk.	648
219a.	83. <i>S. claviformis</i> Litw.	651
220.	84. <i>S. heptapotamica</i> Schischk.	651
221.	85. <i>S. Semenovii</i> Rgl.	651

Section 10. *Spergulifoliae* Boiss.

222.	86. <i>S. spergulifolia</i> (Desf.) M. B.	652
223.	87. <i>S. Brotherana</i> Som. et Lev.	653
224.	88. <i>S. brahuica</i> Boiss.	653
225.	89. <i>S. repens</i> Patr.	654
226.	90. <i>S. cephalantha</i> Boiss.	654
227.	91. <i>S. caespitosa</i> Stev.	655
228.	92. <i>S. supina</i> M. B.	656
229.	93. <i>S. pruinosa</i> Boiss.	656

Section 11. *Auriculatae* Boiss.

230.	94. <i>S. Aucheriana</i> Boiss.	657
—	*95. <i>S. ispiensis</i> Boiss.	657
231.	96. <i>S. Bornmülleri</i> Freyn	658
232.	97. <i>S. Prilipkōana</i> Schischk.	658
4233.	98. <i>S. crispans</i> Litw.	659
4234.	99. <i>S. Popovii</i> Schischk.	659
4235.	100. <i>S. indepressa</i> Schischk.	659
4236.	101. <i>S. pachyneura</i> Schischk.	660
4237.	102. <i>S. sisianica</i> Boiss. et Buhse	660
4238.	103. <i>S. pygmaea</i> Ad	661
4239.	104. <i>S. humilis</i> C. A. M.	662
4240.	105. <i>S. lychnidea</i> C. A. M.	662
4241.	106. <i>S. linearifolia</i> Otth	663
4242.	107. <i>S. kubanensis</i> Som. et Lev.	663
4243.	108. <i>S. turgida</i> M. B.	664
4244.	109. <i>S. depressa</i> M. B.	667

4245. 110. <i>S. Grossheimii</i> Schischk.	667
4246. 111. <i>S. caucasica</i> (Bge.) Boiss.	668
4247. 112. <i>S. Tatianae</i> Schischk.	668
4248. 113. <i>S. incurvifolia</i> Kar. et Kir.	668
4249. 114. <i>S. Schafta</i> Gmel.	669
4250. 115. <i>S. Kuschakewiczii</i> Rgl. et Schmalh.	670
4251. 116. <i>S. pamirensis</i> (H. Winkl.) Preobr.	670
4252. 117. <i>S. karaczukuri</i> B. Fedtsch.	671
4253. 118. <i>S. Meyeri</i> Fenzl.	671
4254. 119. <i>S. guntensis</i> B. Fedtsch.	671
4255. 120. <i>S. araratica</i> Schischk.	671
4256. 121. <i>S. Korshinskyi</i> Schischk.	673
4257. 122. <i>S. Nevskii</i> Schischk.	673
4258. 123. <i>S. alpicola</i> Schischk.	674

Section 12. *Viridiflorae* Boiss.

4259. 124. <i>S. viridiflora</i> L.	674
4260. 125. <i>S. nutans</i> L.	674

Section 13. *Italicae* Rohrb.

4261. 126. <i>S. italica</i> (L.) Pers.	675
---	-----

Section 14. *Holopetalae* Schischk.

4262. 127. <i>S. sibirica</i> (L.) Pers.	676
4263. 128. <i>S. Gebleriana</i> Schrenk.	676
4264. 129. <i>S. holopetala</i> Bge.	677
4265. 130. <i>S. scabrifolia</i> Kom.	677
4266. 131. <i>S. Komarovii</i> Schischk.	678
4267. 132. <i>S. pseudotenuis</i> Schischk.	678
4268. 133. <i>S. trajectorum</i> Kom.	679
4269. 134. <i>S. Bobrovii</i> Schischk.	679
4270. 135. <i>S. kungessana</i> B. Fedtsch.	679
4271. 136. <i>S. shugnanica</i> B. Fedtsch.	680
4272. 137. <i>S. obovata</i> Schischk.	680

Section 15. *Capitellatae* Schischk.

4273. 138. <i>S. capitellata</i> Boiss.	681
---	-----

Section 16. *Rigidulae* Boiss.

4274. 139. <i>S. chaetodonta</i> Boiss.	681
4275. 140. <i>S. arenosa</i> C. Koch	682

Section 17. *Saponarioideae* Boiss.

4276. 141. <i>S. nana</i> Kar. et Kir.	682
--	-----

Subgenus 3. *Otites* (Adans) Schischk.

4277. 142. <i>S. wolgensis</i> (Willd.) Bess.	685
4278. 143. <i>S. densiflora</i> D'Urv.	686
4279. 144. <i>S. pseud-otites</i> Bess.	686
4280. 145. <i>S. baschkirorum</i> Janisch.	687
4281. 146. <i>S. polaris</i> Kleop.	687
4282. 147. <i>S. Hellmannii</i> Claus	688

4283.	148.	<i>S. Cyri</i> Schischk.	688
4284.	149.	<i>S. parviflora</i> (Ehrh.) Pers.	689
4285.	150.	<i>S. media</i> (Litw.) Kleop.	689

Subgenus 4. *Conosilene* (Rohrb.) Williams.

4286.	151.	<i>S. conica</i> L.	690
4287.	152.	<i>S. conoidea</i> L.	690
4288.	153.	<i>S. coniflora</i> N. Esenb.	691

Genus 483. *Lychnis* L.

4289.	1.	<i>L. ajanensis</i> Rgl.	693
4290.	2.	<i>L. sibirica</i> L.	693
4291.	3.	<i>L. villosula</i> (Trautv.) Gorschk.	694
4292.	4.	<i>L. samojedorum</i> (Sambuk) Gorschk.	694
4293.	5.	<i>L. Wilfordi</i> (Rgl.) Maxim.	695
4294.	6.	<i>L. cognata</i> Maxim.	695
4295.	7.	<i>L. fulgens</i> Fisch.	696
4296.	8.	<i>L. chalcedonica</i> L.	696

Genus 489. *Coronaria* L.

4297.	1.	<i>C. coriacea</i> (Moench) Schischk.	699
4298.	2.	<i>C. flos cuculi</i> (L.) A. Braun	700

Genus 490. *Melandrium* Roehl.

Subgenus 1. *Elisanthe* (Fenzl) Schischk.

4299.	1.	<i>M. ovalifolium</i> Rgl.	704
4300.	2.	<i>M. Fedtschenkoanum</i> (Preobr.) Schischk.	705
4301.	3.	<i>M. adenophorum</i> Schischk.	705
4302.	4.	<i>M. ferganicum</i> (Preobr.) Schischk.	706
4303.	5.	<i>M. erubescens</i> Schischk.	706
4304.	6.	<i>M. ruinarum</i> M. Pop.	709
4305.	7.	<i>M. Akinfievii</i> (Schmahl.) Schischk.	709
4306.	8.	<i>M. sachalinense</i> (E. Schmidt) Schischk.	710
4307.	9.	<i>M. viscosum</i> (L.) Čel.	710
4308.	10.	<i>M. quadrilobum</i> (Turcz.) Schischk.	711
4309.	11.	<i>M. suaveolens</i> (Kar. et Kir.) Schischk.	711
4310.	12.	<i>M. noctiflorum</i> (L.) Fries	712
4311.	13.	<i>M. Olgae</i> Maxim.	712
4312.	14.	<i>M. apricum</i> (Turcz.) Rohrb.	713
4313.	15.	<i>M. firmum</i> (Sieb. et Zucc.) Rohrb.	713

Subgenus 2. *Castrolychnis* (Fenzl) Schischk.

4314.	16.	<i>M. longicarpophorum</i> Kom.	714
4315.	17.	<i>M. Soczavianum</i> Schischk.	715
4316.	18.	<i>M. sordidum</i> (Kar. et Kir.) Rohrb.	715
4317.	19.	<i>M. triste</i> (Bge.) Fenzl.	715
4318.	20.	<i>M. apetalum</i> (L.) Fenzl.	716
4319.	21.	<i>M. affine</i> J. Vahl	719
4320.	22.	<i>M. angustiflorum</i> (Rupr.) Walp.	720
4321.	23.	<i>M. tenellum</i> A. Tolm.	721
4322.	24.	<i>M. gracile</i> A. Tolm.	721

4323.	25. <i>M. taimyrense</i> A. Tolm.	721
4324.	26. <i>M. brachypetalum</i> (Horn.) Fenzl.	722
4325.	27. <i>M. baicalense</i> (Suk.) A. Tolm.	723
4326.	28. <i>M. saxatile</i> (Turcz.) A. Br.	723

Subgenus 3. *Eumelandrium* (A. Br.) Schischk

4327.	29. <i>M. silvestre</i> (Schkuhr) Roehl.	724
4328.	30. <i>M. Balansae</i> Boiss.	724
4329.	31. <i>M. album</i> (Mill.) Garcke	725
4330.	32. <i>M. Boissieri</i> Schischk.	725
4331.	33. <i>M. astrachanicum</i> Pacz.	726

Genus 491. *Petrocoma* Rupr.

4332.	1. <i>P. Hoefftiana</i> (Fisch.) Rupr.	729
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Genus 492. *Cucubalus* L.

4333.	1. <i>C. baccifer</i> L.	729
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Tribe 2. DIANTHEAE PAX

Genus 493. *Gypsophila* L.

Subgenus 1. *Rckejeka* (Forsk.) Graebn.

Section 1. *Heterochroa* (Bge.) Schischk.

4334.	1. <i>G. glandulosa</i> (Boiss.) Walp.	738
4335.	2. <i>G. violacea</i> (Ldb.) Fenzl	739
4336.	3. <i>G. sericea</i> (Ser.) Fenzl	739
4337.	4. <i>G. desertorum</i> (Bge.) Fenzl	740
4338.	5. <i>G. microphylla</i> (Schrenk) Fenzl	740
4339.	6. <i>G. turkestanica</i> Schischk.	743
4340.	7. <i>G. herniarioides</i> Boiss.	743
4341.	8. <i>G. Antoninae</i> Schischk.	744

Section 2. *Pulvinares* Boiss.

4342.	9. <i>G. aretioides</i> Boiss.	744
4343.	10. <i>G. imbricata</i> Rupr.	745

Section 3. *Capitatae* Boiss.

4344.	11. <i>G. capitata</i> M.B.	745
4345.	12. <i>G. glomerata</i> Pall.	746
4346.	13. <i>G. globulosa</i> Stev.	746
—	*14. <i>G. cappadocica</i> Boiss.	747

Section 4. *Eugypsophila* Boiss.

4347.	15. <i>G. fastigitata</i> L.	747
4348.	16. <i>G. ucrainica</i> Kleop.	748
4349.	17. <i>G. dichotoma</i> Bess.	748
4350.	18. <i>G. paniculata</i> L.	749
4351.	19. <i>G. bicolor</i> Freyn et Sint.	749
4352.	20. <i>G. altissima</i> L.	750
4353.	21. <i>G. tianschanica</i> M. Pop.	750
4354.	22. <i>G. Litwinowii</i> Kos.-Pol.	751
4355.	23. <i>G. Krascheninnikovii</i> Schischk.	751

4356.	24. <i>G. cephalotes</i> (Schrenk) Will.	752
—	*25. <i>G. simulatrix</i> Bornm. et Woron.	752
4357.	26. <i>G. albida</i> Schischk.	753
4358.	27. <i>G. diffusa</i> Fisch. et Mey.	753
4359.	28. <i>G. Szowitzii</i> Fisch. et Mey.	754
4360.	29. <i>G. virgata</i> Boiss.	754
4361.	30. <i>G. aulieatansensis</i> B. Fedtsch.	757
—	*31. <i>G. eriocalyx</i> Boiss.	757
4362.	32. <i>G. acutifolia</i> Fisch.	757
4363.	33. <i>G. Stevenii</i> Fisch.	758
4364.	34. <i>G. Meyeri</i> Rupr.	759
4365.	35. <i>G. glauca</i> Stev.	759
4366.	36. <i>G. trichotoma</i> Wend.	759
4367.	37. <i>G. scorzonrifolia</i> Ser.	760
4368.	38. <i>G. anatolica</i> Boiss.	761
4369.	39. <i>G. yorae</i> Woron.	761
4370.	40. <i>G. robusta</i> Grossh.	761
4371.	41. <i>G. tenuifolia</i> M. B.	762
4372.	42. <i>G. Steupii</i> Schischk.	762
4373.	43. <i>G. uralensis</i> Less.	763
4374.	44. <i>G. Sambukii</i> Schischk.	763
4375.	45. <i>G. elegans</i> M. B.	764
4376.	46. <i>G. silenoides</i> Rupr.	767
4377.	47. <i>G. heteropoda</i> Freyn	767
4378.	48. <i>G. Patrinii</i> Ser.	767
4379.	49. <i>G. dahurica</i> Turcz.	768
4380.	50. <i>G. pacifica</i> Kom.	768
4381.	51. <i>G. capituliflora</i> Rupr.	768
4382.	52. <i>G. Preobrashenskyi</i> Czernjak.	769
4383.	53. <i>G. Lipskyi</i> Schischk.	769
—	*54. <i>G. brachypetala</i> Trautv.	770
4384.	55. <i>G. hispida</i> Boiss.	770
4385.	56. <i>G. Fedtschenkoana</i> Schischk.	770

Section 5. *Bucharicae* B. Fedtsch.

4386.	57. <i>G. bucharica</i> B. Fedtsch.	771
4387.	58. <i>G. intricata</i> Franch.	771

Section 6. *Pseudoacanthophyllum* Boiss.

4388.	59. <i>G. Popovii</i> Preobr.	772
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Subgenus 2. *Dichoglottis* (Fisch. et Mey.) Endl.

4389.	60. <i>G. linearifolia</i> (Fisch. et Mey.) Boiss.	772
4390.	61. <i>G. spathulifolia</i> (Fisch. et Mey.) Fenzl	773
4391.	62. <i>G. alsinoides</i> Bge.	773

Subgenus 3. *Macrorrhizaea* Boiss.

4392.	63. <i>G. muralis</i> L.	774
4393.	64. <i>G. stepposa</i> Klok.	774
4394.	65. <i>G. floribunda</i> (Kar. et Kir.) Turcz.	775
4395.	66. <i>G. filipes</i> (Boiss.) Schischk.	775
—	*67. <i>G. picta</i> Boiss.	776

Subgenus 4. *Hagenia* (Moench) A. Br.

4396.	68. <i>G. porrigens</i> (L.) Fenzl	776
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Genus 494. *Tunica* (Hall.) Scop.

4397.	1. <i>T. saxifraga</i> (L.) Scop.	777
4398.	2. <i>T. stricta</i> (Bge.) Fisch. et Mey.	778
4399.	3. <i>T. pachygonia</i> Fisch. et Mey.	778

Genus 495. *Kohltrauschia* Kunth.

4400.	1. <i>K. prolifera</i> (L.) Kunth	779
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Genus 496. *Acanthophyllum* C. A. M.

Подрод 1. *Euacanthophyllum* (Boiss.) Schischk.

Секция 1. *Oligosperma* Schischk.

4401.	1. <i>A. squarrosus</i> Boiss.	783
4402.	2. <i>A. pungens</i> (Bge.) Boiss.	784
4403.	3. <i>A. lilacinum</i> Schischk.	787
4404.	4. <i>A. albidum</i> Schischk.	787
4405.	5. <i>A. subglabrum</i> Schischk.	787
4406.	6. <i>A. tenuifolium</i> Schischk.	788
4407.	7. <i>A. stenostegium</i> Freyn	788
4408.	8. <i>A. turcomanicum</i> Schischk.	789
4409.	9. <i>A. Korshinkii</i> Schischk.	789
4410.	10. <i>A. adenophorum</i> Freyn	789
4411.	11. <i>A. Krascheninnikovii</i> Schischk.	790
4412.	12. <i>A. brevibracteatum</i> Lipsky	790
4413.	13. <i>A. aculeatum</i> Schischk.	791
4414.	14. <i>A. acerosum</i> Sosn.	791
4415.	15. <i>A. pulchrum</i> Schischk.	791
4416.	16. <i>A. elatius</i> Bge.	792
4417.	17. <i>A. Borszewii</i> Litw.	792

Subgenus 2. *Turbinaria* Boiss.

4418.	18. <i>A. mucronatum</i> C. A. M.	793
4419.	19. <i>A. microcephalum</i> Boiss.	793

Section 3. *Pleiosperma* Boiss.

4420.	20. <i>A. sordidum</i> Bge.	793
4421.	21. <i>A. glandulosum</i> Bge.	794
4422.	22. <i>A. Knorringianum</i> Schischk.	794
4423.	23. <i>A. schugnanicum</i> (Preobr.) Schischk.	795

Section 4. *Macrostegia* Boiss.

4424.	24. <i>A. Korolkowii</i> Rgl. et Schm.	795
4425.	25. <i>A. elongatum</i> Preobr.	796
4426.	26. <i>A. serawschanicum</i> Golenk.	796
4427.	27. <i>A. coloratum</i> (Preobr.) Schischk.	799

Subgenus 2. *Allochrysa* (Bge.) Schischk.

Section 1. *Versicoloria* Schischk.

4428.	28. <i>A. versicolor</i> Fisch. et. Mey.	799
4429.	29. <i>A. Bungei</i> (Boiss.) Trautv.	800
4430.	30. <i>A. transhyrcanum</i> Preobr.	800

Section 2. *Paniculata* Golenk.

4431.	31. <i>A. paniculatum</i> Rgl.	800
4432.	32. <i>A. gypsophiloides</i> Rgl.	801
4433.	33. <i>A. tadshikistanicum</i> Schischk.	801

Genus 497. *Vaccaria* Medic.

4434.	1. <i>V. segetalis</i> (Neck.) Garcke	802
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Genus 498. *Dianthus* L.

Subgenus 1. *Armeriastrum* Ser.

Section 1. *Armerium* Williams

4435.	1. <i>D. armeria</i> L.	812
4436.	2. <i>D. pseudarmeria</i>	812

Section 2. *Carthusiani* Boiss.

4437.	3. <i>D. capitatus</i> Balbisi	813
4438.	4. <i>D. Andrzejowskianus</i> (Zapal.) Kulcz.	813
4439.	5. <i>D. subulosa</i> Freyn et Conr.	814
4440.	6. <i>D. carthusianorum</i> L.	814
4441.	7. <i>D. Rogowiczii</i> Kleop.	817
4442.	8. <i>D. membranaceus</i> Borb.	817
4443.	9. <i>D. eu-ponticus</i> Zapal.	818
4444.	10. <i>D. Ruprechtii</i> Schischk.	818
4445.	11. <i>D. transcaasicus</i> Schischk.	819
4446.	12. <i>C. calocephalus</i> Boiss.	819
4447.	13. <i>D. polymorphus</i> M. B.	820
4448.	14. <i>D. Borbasii</i> Vand.	820
4449.	15. <i>D. barbatus</i> L.	821

Subgenus 2. *Caryophyllum* Ser.

Section 1. *Barbulatum* Williams

4450.	16. <i>D. repens</i> Willd.	822
4451.	17. <i>D. Raddeanus</i> Vierh.	823
—	17. <i>D. chinensis</i> L.	823
4452.	18. <i>D. versicolor</i> Fisch.	824
4453.	19. <i>D. Fischeri</i> Spreng.	824
4454.	20. <i>D. Semenovii</i> (Rgl. et Herd.) Vierh.	825
4455.	21. <i>D. discolor</i> Smith.	825
4456.	22. <i>D. Kusnezovii</i> V. Marcovicz	826
4457.	23. <i>D. imereticus</i> (Rupr.) Schischk.	827
4458.	24. <i>D. amurensis</i> Jacq.	827
4459.	25. <i>D. turkestanicus</i> Preobr.	827
4460.	26. <i>D. pratensis</i> M. B.	828
4461.	27. <i>D. kubanensis</i> Schischk.	828

4462.	28. <i>D. guttatus</i> M. B.	829
4463.	29. <i>D. bicolor</i> Adams	829
4464.	30. <i>D. campestris</i> M. B.	830
4465.	31. <i>D. carbonatus</i> Klok.	830
4466.	32. <i>D. hypanicus</i> Andrz.	833
4467.	33. <i>D. elatus</i> Ldb.	833
4468.	34. <i>D. Preobrashenskii</i> Klok.	834
4469.	35. <i>D. Eugeniae</i> Kleop.	834
4470.	36. <i>D. pallidiflorus</i> Ser.	835
4471.	37. <i>D. ramosissimus</i> Pall.	835
4472.	38. <i>D. rigidus</i> M. B.	836
4473.	39. <i>D. uralensis</i> Korsh.	836
4474.	40. <i>D. kirghizicus</i> Schischk.	837
4475.	41. <i>D. humilis</i> Willd.	837
4476.	42. <i>D. acantholimonoides</i> Schischk.	837
4477.	43. <i>D. Grossheimii</i> Schischk.	838
4478.	44. <i>D. deltoides</i> L.	838

Section 2. *Leiopetali* Boiss.

4479.	45. <i>D. lanceolatus</i> Stev.	839
4480.	46. <i>D. leptopetalus</i> Willd.	840
4481.	47. <i>D. schemachensis</i> Schischk.	840
— *	48. <i>D. Andronakii</i> Woron.	841
4482.	49. <i>D. Marschallii</i> Schischk.	841
4483.	50. <i>D. inamoenus</i> Schischk.	842
4484.	51. <i>D. azkurensis</i> Sosn.	845
4485.	52. <i>D. floribundus</i> Boiss.	845
4486.	53. <i>D. petraeus</i> M. B.	845
4487.	54. <i>D. multicaulis</i> Boiss. et Huet	845
4488.	55. <i>D. fragrans</i> Adams	846
4489.	56. <i>D. talyschensis</i> Boiss. et Buhse	847
— *	56. <i>D. caryophyllus</i> L.	847

Section 3. *Plumaria* (Opiz) Asch. et Graebn.

4490.	57. <i>D. libanotis</i> Lab.	848
4491.	58. <i>D. arenarius</i> L.	848
4492.	59. <i>D. acicularis</i> Fisch.	849
4493.	60. <i>D. squarrosus</i> M. B.	849
4494.	61. <i>D. crinitus</i> Sm.	850
4495.	62. <i>D. crossopetalus</i> Fenzl.	850
— *	63. <i>D. recognitus</i> Schischk.	851
4496.	64. <i>D. Kuschakewiczii</i> Rgl. et Schmalh.	851
4497.	65. <i>D. tianschanicus</i> Schischk.	851
4498.	66. <i>D. seravschanicus</i> Schischk.	852
4499.	67. <i>D. karataviensis</i> N. Pavl.	852
4500.	68. <i>D. soongoricus</i> Schischk.	853
4501.	69. <i>D. turcomanicus</i> Schischk.	853
4502.	70. <i>D. tetralepis</i> Nevski	854
4503.	71. <i>D. orientalis</i> Adams	854
4504.	72. <i>D. canescens</i> C. Koch	854
4505.	73. <i>D. tabrisianus</i> Bienert	855

4506.	74. <i>D. macronyx</i> Fenzl	855
4507.	75. <i>D. superbus</i> L.	856
4508.	76. <i>D. Hoeltzeri</i> Winkl.	856
4509.	77. <i>D. stenocalyx</i> (Trautv.) Juz.	859

Section 4. *Verruculosi* Boiss.

4510.	78. <i>D. cyri</i> Fisch.	860
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Genus 499. *Saponaria* L.

4511.	1. <i>S. glutinosa</i> M. B.	863
4512.	2. <i>S. officinalis</i> L.	863
4513.	3. <i>S. Griffithiana</i> Boiss.	864
4514.	4. <i>S. Sewerzowii</i> Rgl. et Schmalh.	867
4515.	5. <i>S. prostrata</i> Willd.	867
4516.	6. <i>S. parvula</i> Bge.	867
4517.	7. <i>S. cerastoides</i> Fisch.	868
4518.	8. <i>S. viscosa</i> C. A. M.	868
4519.	9. <i>S. orientalis</i> L.	869

Genus 500. *Velezia* L.

4520.	1. <i>V. rigida</i> L.	870
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PREFACE

Each new volume of the "Flora of the U.S.S.R." is gratifying as a major scientific achievement and as an accomplished stage of a great collective work. It also emphasizes the grandiose dimensions of the Flora and the difficulty of bringing such a work to a conclusion. Meanwhile, with Rubiaceae, Compositae, and other far more prominent families still missing, there is no "Flora" in the full sense of the word, nothing can be summed up, and no necessary generalizations can be made or conclusions drawn. The history of Volume VI provides striking evidence of the scope of the work. According to the original plan, a part of this volume (Chenopodiaceae) was to be included in Volume V, while the second part (Caryophyllaceae) was intended for Volume VI, which should have also contained the Ranunculaceae. However, Volume V had expanded to such proportions that it proved necessary to take out Chenopodiaceae, while Ranunculaceae and related families had to be referred to a separate volume that had not been foreseen.

Volume VI contains the entire group of plants designated collectively as the order Centrospermae on account of the curved embryo embedded in perisperm and occupying a central position within the seed. The most important families of this order, Chenopodiaceae and Caryophyllaceae, contain a profusion of both genera and species, even though many of the genera are oligotypic or even monotypic. These families attain their outstanding development in the Mediterranean region and its eastward extensions, while being rather poorly represented in the north.

Chenopodiaceae are more particularly associated with Central Asia, where they are of considerable economic importance in desert and semidesert areas. In Turkmenia, Kazakhstan, and parts of Uzbekistan, they have no equals as pasture and forage plants and as the exclusive source of desert fuel. The great biochemical variability made it necessary to give special attention to their mineral composition, and some of the plants contain alkaloids. M. M. Il'in has managed brilliantly the most difficult diagnostics of these plants and his treatment makes it possible to cope with the most involved problems of Chenopodiaceae systematics. The same may be said about the extensive and laborious studies carried out by B. K. Shishkin on the family Caryophyllaceae, which is one of the largest in our Flora. This family, rich in saponins, contains both pasture plants and important weeds of our grain crops. Both families are also of considerable theoretical importance, since they have in the Soviet Union independent speciation centers characteristically associated with the southern republics, including a rather large number of genera and species that do not occur in anywhere else in the world.

It should be pointed out that this volume completes five hundred genera and brings the number of species halfway through the fifth thousand, which covers about one-third of the whole Flora.

The Editors

1 Order 19. **Centrospermae** ENGL.

Flowers with simple perianth; tepals green or colored, often clearly differentiated into calyx and corolla; stamens 1 to many, mostly as many as and opposite the perianth segments; ovary mostly superior, rarely inferior, uni- or plurilocular; embryo central; seeds containing endosperm; embryo horseshoe-shaped, annular, spiral, or curved. Herbs, more rarely undershrubs, or very rarely trees, with alternate or opposite leaves, stipulate or exstipulate.

Key to Families

- 1. Perianth rudimentary or more or less developed but simple, corolloid or caliciform 2.
- + Perianth consisting of calyx and corolla 8.
- 2. Fruit a black or dark red berry; flowers in large racemes
. Family LVII. *Phytolaccaceae* Lindl.
- + Fruit a capsule, drupe, or nut 3.
- 3. Flowers unisexual, the pistillate in the axils of lower leaves; fruit a drupe Family LVI. *Thelygonaceae* Eichl.
- + Flowers bisexual or some unisexual by abortion; fruit a drupe or nut 4.
- 4. Fruit a many-seeded capsule; flowers often containing staminodes . . .
. Family LVIII. *Aizoaceae* A. Br.
- + Fruit a 1-seeded nut 5.
- 5. Perianth petaloid, strongly enlarging after flowering and transforming into an involucre enveloping the fruit.
. Family LV. *Nyctaginaceae* Lindl.
- + Perianth of 3 segments or scarious 6.
- 6. Perianth scarious; style 1 Family LIV. *Amaranthaceae* Juss.
- + Perianth herbaceous or fleshy, very rarely dry scarious (genus *Polycnemonum*); styles 2—5. 7.
- 7. Leaves opposite, with or without stipules, if exstipulate then abortive fruits present Family LX. *Caryophyllaceae* Juss.
- 2 + Leaves alternate, very rarely opposite and then exstipulate
. Family LIII. *Chenopodiaceae* Less.
- 8. Calyx 2-parted, sometimes adnate to ovary at base
. Family LIX. *Portulacaceae* Lindl.
- + Calyx of 5 or rarely 4 distinct or united sepals
. Family LX. *Caryophyllaceae* Juss.

FAMILY LIII. **CHENOPODIACEAE** LESS.

Flowers actinomorphic, more rarely zygomorphic, mostly 5-merous, rarely 1—4-merous, often bracteolate, bisexual or unisexual, in the latter case the plants monoecious or dioecious; perianth simple, rarely wanting, herbaceous, only exceptionally petaloid (*Anthochlamys*), mostly chorisepalous, more rarely united, forming in fruit various spiny, winglike or otherwise shaped appendages, or becoming succulent and berrylike, or rarely unchanged; stamens 1—5, opposite the perianth lobes, the filaments often united into a hypogynous disk and alternating with semicircular or otherwise shaped staminodes; anthers often terminating in various flat or saccate appendages or unappendaged; ovary 2—5-carpellate, 1-locular, superior, containing 1 ovule; stigmas, 2—5, variously shaped, sessile or borne on styles; ovule basal, campylotropous, often borne on a long funiculus; fruit with a hard or scarious pericarp or baccate, indehiscent or very rarely with circumscissile dehiscence (*Hablitzieae* and *Beteae*, sometimes forming aggregates (*Spinacia*, *Beta*); seeds vertical or horizontal, with a horseshoe-shaped, annular, or spirally coiled embryo, with or without endosperm. Plants often succulent, characteristic of saline and alkaline soils.

Note. According to recent counts, the family contains about 100 genera and 1,400 species, distributed all over the world. It is usually separated into two subfamilies, *Cyclolobeae* C. A. M. and *Spirolobeae* C. A. M., to which Prof. Ulbrich is inclined to attribute a higher taxonomic status, while retaining the concept of subfamily for the tribes (*Polycnemeae*, *Chenopodieae*, *Atripliceae*, etc.). We cannot agree with such an approach and we therefore retain the old system in the present treatment. We do, however, introduce a modification in that we cut out completely the subtribe *Anabasinæ* as being artificial and merely based on a single formal character, the vertical position of the ovary. Thus, for instance, such natural genera as *Arthrophytum* Schrenk or *Anabasis* L., genetically very closely related, would have to be referred on account of this character to different subtribes. A more precise systematic subdivision of this tribe may become possible only after further detailed study of the representatives of *Salsoleae*. Finally, as regards the sectional classification of the major genera of *Chenopodiaceae*, the position had been altogether unsatisfactory in most cases. Such unacceptable division into sections had applied to the genera *Suaeda* Forsk. and *Salsola* L., and it was therefore necessary to devise for these genera a new sectional division that would indicate the actual phylogenetic ties between the sections. In our deserts and semideserts, covering enormous areas in the USSR, representatives of this family constitute a dominant and sometimes exclusive component of the vegetation. Considering also the great economic value of these plants in such areas, the ease of identification of the species concerned becomes a matter of outstanding importance not only for botanists but also for those concerned with more restricted practical problems. It is, however, well known that this family presents great difficulties even for the taxonomist because of external

resemblance between various plants, the outstandingly developed polymorphism, and marked modifications due to age. All known identification keys open with embryo characteristics and are subsequently worked out in relation to the detailed structure of the small flowers and fruits. In view of the considerations outlined above, we have made an attempt to provide, in addition to the usual key — which is based on the generative organs and which, in the course of the description, indicates the natural tribes of the family — an additional key (Key II) based on vegetative parts. In this key, features relating to flowers and fruits have occasionally been incorporated as supplementary characters. It is clear to anyone familiar with this family what heavy obstacles have had to be surmounted in composing such a key; it is therefore quite likely that in some instances difficulties may be encountered that may necessitate recourse to Key I. As far as possible, plants for identification should be collected in fruiting condition. Some words of explanation are called for to clarify certain characters that appear in both Key I and Key II. To begin with, determination of the embryo shape does not present any great difficulty with ripe fruits, especially in the case of mature plants. The embryo is best removed by squeezing out the seed coat from the pericarp with the aid of a needle. When working with herbarium specimens, preliminary boiling is necessary. With hard seed coats, as in the case of *Chenopodium* L. or *Suaeda* Forsk., the coat must be crushed to enable release of the embryo. The position of the embryo is also of major diagnostic value; this is usually determined by the position of seed and fruit: the embryo may

4 be placed horizontally or vertically or, rarely, obliquely in relation to the longitudinal axis of the flower; for the sake of brevity, the seed is simply referred to in descriptions and in the key as horizontal or vertical. A character of considerable importance is provided by anther appendages which form a continuation of the connective; these may be caudate (Plate X, Figure 2a), flat and scarious (Plate XV, Figure 4b), saccate (Plate I, 5 XVI, Figure 3b), tuberclelike, etc. Of recognized diagnostic value in various tribes and genera is the shape of the foliaceous bracteoles which may be as long as the flower, much shorter, or else much longer and completely covering the flower (*Atriplex* L., Plate IV, Figure 7a). The bracteoles may be green and leaflike, or differing but little from the leaves, or they may be whitish, scarious and semitransparent. The latter are sometimes perceptible only upon careful examination because of their small size (*Suaeda* Forsk., etc.).

It is sometimes rather difficult for an untrained observer to determine whether a given plant of the family in question is annual or suffrutescent. The difficulty is due to the fact that lignification of the lower part of the stem and of the root sets in promptly in the course of the first growing season and growth in thickness proceeds very vigorously. Failure to include the root in collection or careless observation may easily result in the stem of an annual plant being mistaken for one belonging to an undershrub. It may be noted in this connection that the stem of annuals usually passes gradually into the root, whereas, in the case of suffrutescent plants, there are always vestiges of old stems at the base of the plant. It is necessary to examine the root system carefully before considering the question of longevity. The internal structure of *Chenopodiaceae* is known to differ markedly from that of the structural scheme of dicotyledons

and to approach arboraceous monocotyledons in this respect. A characteristic feature of this family is the concentric alternation of xylem and phloem due to periodic dying off and renewed formation of the cambial ring and its unilateral activity that results in centripetal accumulation of both phloem and xylem. The annual stem and root thus have a number of "annual rings" which have in fact been formed during a single growth period. Only in the genus *Polycnemon* L. do we encounter normal stem and root anatomy. We have included this character in the key to genera where the distinguishing features of the genus *Polycnemon* are indicated.

5 When deciding whether the leaves and branches are alternate or opposite, it is also necessary to consider carefully the plant as a whole, since in most genera of this family the lowermost 1—3 pairs, and more rarely, additional ones, are opposite, the others being alternate, while sometimes only bracteal leaves are alternate. Therefore, when a plant is described as having alternate leaves, the lowest leaves are not taken into consideration; on the other hand, when leaves are designated as opposite, it is understood that the leaves all the way up are opposite. The way in which the leaves are inserted on the stem also constitutes a character of major systematic importance. We distinguish sessile decurrent leaves with margins extending down the stem like an edging (Plate X, Figure 7), a succulent sheath (Plate I, Figure 11), or, more often an inconspicuous gradual prolongation of the leaf or rather a green stripe (Plate I, Figure 10) as, for instance, in the section *Physurus* Iljin of the genus *Salsola* L. The leaf base in section *Caroxylon* Iljin of the same genus is most unusual in extending downward as a tubercle attached to the stem, so that a downward-facing chink separates the stem from the lower part of the leaf base (Plate I, Figure 8). In the section *Anchophyllum* Iljin of the genus *Salsola* L. there is a constriction, mostly abrupt, above a short, enlarged, often whitish and tuberclelike base, and leaf abscission takes place at the constriction (Plate I, Figure 9). All these characters relating to leaf base are of diagnostic value and they have been employed in Key II to genera.

Indument characteristics are also of great value for identification purposes. Thus the tribe *Camphorosmeae* and many *Salsoleae* are characterized by the presence of articulate hairs with indentations that are in fact minute branches (Plate I, Figure 12). The hairs of *Corispermaceae* are branched (Plate I, 15), those of certain genera of *Atripliceae* (*Axyris* L., *Ceratocarpus* L., *Eurotia* Adans.) stellate and sometimes with a long articulate hair arising from the center (Plate I, Figures 13 and 14). Close examination is required since two types of hairs may occur together as, e.g., in *Salsola vvedenskyi* Iljin et M. Pop., where, above a lining of very short branched hairs, there is a cover of long jointed bristles. Besides typical hairs, some *Chenopodiaceae* (*Ofaiston* Rafin., *Salsola nodulosa* (Moq.) Iljin, and *S. gemnascens* Pall.) have 2-tipped scales (Plate XIV, 1a) or even 2-tipped hairs (*Petrosimonia* Bge). The mealy bloom, so characteristic of the genera *Chenopodium* L. and *Atriplex* L., is merely a particular type of very short, inflated, air-filled hairs which give the impression of a grayish efflorescence.

Economic importance. In view of the fact that members of this family play a dominant role in the landscapes of our semidesert and desert plains, they acquire decisive economic importance. To begin with, they constitute under these conditions almost the only kind of summer and, more particularly, winter forage for camels and sheep. Suffrutescent and frutescent species of saltwort, together with loosestrife, serve as an exclusive source of fuel in the deserts, while arborescent haloxylons are known to be of special value in this respect beside their use for industrial purposes. Very many species of this family, owing to their high content of salts, especially carbonates, are used for extraction of potash and soda. The family also contains highly important cultivated plants, such as beet, spinach, and quinoa. Many of the wild plants are of value for food and as a source of dyes, alkaloids, drugs, etc. These applications are discussed in reference to the plants concerned.

I. Key to Genera

1. Embryo hippocrepiiform or annular (Plate I, Figures 1 and 2); seeds albuminous (Subfamily 1. Cyclolobeae C. A. M.) 2.
- + Embryo spirally coiled (Plate I, Figures 3 and 4); seeds exalbuminous (Subfamily 2. Spirollobeae C. A. M.) 25.
2. Roots and stems with normal anatomic structure; leaves trigonous-subulate, needle-shaped; flowers solitary in the leaf axils, with scarious lance-acuminate 1-nerved bracteoles; seeds vertical, prominently granular (Tribe Polycnemeae) 397. *Polycnemum* L.
- + Roots and often stems with xylem and phloem in alternating concentric circles; differing from the above in other characters. 3.
3. Plants jointed, more or less succulent, with rudimentary leaves; inflorescence a compact slender spike with flowers immersed in the axis (Tribe Salicornieae) 4.
- + Plants not jointed; inflorescence unlike the above; flowers not immersed in the axis 8.
4. Annual plants 5.
- + Undershrubs 6.
5. Branches opposite; leaves completely undeveloped; seeds covered with hooked hairs. 420. *Salicornia* L.
- + Leaves and branches alternate; lower leaves subglobular, the others reduced to round amplexicaul decurrent structures; seeds papillose. 417. *Halopeplis* Bge.
6. Leaves and branches alternate; perianth of 4 segments 416. *Kalidium* Moq.
- + Leaves and branches opposite; perianth of 3 segments 7.
7. Shrub with the normal type of branching; green branches covered with minute more or less pointed warts; inflorescence composed of compact elongated stalked spikes 418. *Halostachys* C. A. M.
- + A hemispherical plant with green smooth branches; flowers sessile, not spiked. 419. *Halochnemum* M. B.

- 7 8. Flowers unisexual, the plants monoecious or more rarely dioecious; pistillate flowers often without perianth, nearly always enclosed by 2 bracteoles (Plate I, Figure 7) (Tribe Atripliceae) 9.
- + Flowers perfect, rarely some unisexual by abortion of stamens or pistils; bracteoles mostly wanting 13.
9. Plants glabrous or farinose 10.
- + Plants with stellate hairs (Plate I, Figures 13 and 14) 11.
10. Monoecious plants; fruiting bracteoles [valves] without hornlike projections 403. *Atriplex* L.
- + Dioecious plants; valves with prickly hornlike projections (except in some horticultural forms) 402. *Spinacia* L.
11. A shrub; fruit with a tuft of long hairs 404. *Eurotia* Adans.
- + Annual plants 12.
12. Leaves with a very short petiole, acute, acuminate, or obtuse, but not point-tipped; inflorescences terminal; perianth of pistillate flowers 3-parted; valves without hornlike projections; branches alternate 406. *Axyris* L.
- + Leaves without distinct petiole but gradually narrowed at base, always acuminate and spinous-tipped; flowers solitary, not forming an inflorescence; pistillate flowers without perianth; valves with prickly hornlike projections; branches alternate and opposite on the same plant 405. *Ceratocarpus* L.
13. Plants covered with branched hairs (Plate I, Figure 15) at least on the bracteal leaves, very rarely glabrous and then perianth petaloid; rather stiff plants, often spiny and usually associated with sandy habitats; perianth mostly rudimentary; fruit vertical, stiffish, mostly rounded or beaked (Tribe Corispermæ) 14.
- + Plants destitute of branched hairs, differing from the preceding . . . 16.
14. Plants quite glabrous (only in inflorescence scarcely pubescent); perianth white or roseate, petaloid, of 5 equal segments; fruit rounded 415. *Anthochlamys* Fenzl.
- + Plants covered with stellate hairs at least on the bracteal leaves, very rarely glabrous (*Agriophyllum palezkianum* and *Corispermum hillariae*); perianth not petaloid, scarious, usually with fewer than 5 segments or, if rarely 5-merous, the segments unequal 15.
- 8 15. Fruit with long variously shaped beaks at summit, its walls readily dehiscent by means of round apertures through which the seeds are released; leaves having 3 to many veins 414. *Agriophyllum* M. B.
- + Fruit not beaked, sturdy-walled, often on the circumference winged; leaves mostly 1—3-veined 413. *Corispermum* L.
16. Plants glabrous or rarely the stem sparsely covered in upper part with simple hairs; leaves relatively broad, flat, distinctly petiolate, ovate to broad-ovate, often farinose 17.
- + Plants always hairy, the hairs commonly covered with minute prickles (strong magnification!); leaves filiform or cylindric to oblong-oval, always entire, without petiole though often narrowed toward base (Tribe Camphorosmeæ) 20.
17. Fruit circumscissile or, if this is noticeable only at germination, then flowers united by means of fused indurated perianths (see, however, under *Beta lomatomogona*) 18.

- + Fruit sometimes indehiscent; flowers always free (Tribe Chenopodieae) 19.
- 18. Trailing plants; leaves thin, deeply cordate, resembling the leaves of the genus *Tamus*; flowers free; fruiting perianth persistent, stiffly membranous, widely expanded and regularly stellate (Tribe *Hablitzieae*) 398. *Hablitzia* M.B.
- + Plants not trailing; flowers fused; fruiting perianth indurated (Tribe *Beteae*) 399. *Beta* L.
- 19. Perianth of a single segment, only in one species from Pamir of 3 united segments; stamen always 1. 401. *Monolepis* Schrad.
- + Perianth mostly 5-merous, rarely 3-merous. 400. *Chenopodium* L.
- 20. Fruit vertical (see, however, under *Londesia*) 21.
- + Fruit horizontal. 24.
- 21. Perianth 4-merous, often with 2 longer lateral lobes, always wingless in fruit. 407. *Camphorosma* L.
- + Perianth 5-merous. 22.
- 22. Perianth adnate to fruit, hence the latter apparently hairy; flowers covered with long tangled hairs, resembling cotton balls; seeds mostly horizontal, some vertical. 410. *Londesia* Fisch. et Mey.
- 9 + Perianth not adnate to fruit; fruit vertical, glabrous; flowers not resembling cotton balls even when covered with long hairs 23.
- 23. Stem densely covered with short and occasional long hairs; bracteal leaves slightly revolute and arched-recurved; perianth always wingless, with long hairs at base, these surpassing the perianth 409. *Kirilowia* Bge.
- + Stem densely covered with long loosely tangled hairs interspersed with shorter or long horizontally spreading ones; bracteal leaves not arched-recurved; hairs of perianth short 408. *Pandertia* Fisch. et Mey.
- 24. Fruiting perianth with winglike appendages 412. *Kochia* Roth.
- + Fruiting perianth with prickly or hooked appendages 411. *Echinopsilon* Moq.
- 25. Bracteoles scarious, semitransparent, nearly always shorter than perianth; stigmas papillose on all sides; embryo coiled in a single plane (Plate I, Figure 3); plants glabrous, very rarely obsoletely hairy on the inflorescence axis (Tribe *Suaedaeae*) 26.
- + Bracteoles herbaceous and often stiff, rather frequently carinate, as long as or longer or very rarely shorter than the perianth; stigmas papillose only on the inner side; embryo rarely coiled in a single plane, the coil mostly slantingly obconic (Plate I, Figure 4); plants glabrous or hairy (Tribe *Salsoleae*). 29.
- 26. Leaves in upper part of the plant broad, ovate to oblong-ovate, appressed to the stem and tightly imbricated, concealing the stem and flowers; perianth 5-merous, 2 or 3 of the segments with oblong winglike outgrowths at the apex; seeds vertical. 422. *Alexandra* Bge.
- + Leaves sometimes not imbricated; plants differing in other characters 27.
- 27. Flowers unisexual; perianth of pistillate flowers fleshy, united nearly all the way up, 3-5-toothed at the summit, pyriform or obovoid, adnate to ovary and to pericarp, forming a berrylike fruit; stigmas subulate; seeds vertical 423. *Borszczowia* Bge.

- + Flowers perfect or with more or less developed pistils; perianth different from the above 28.
- 28. Annual plants; leaves adnate at base to branchlets; flowers borne on the bracteal leaf at some distance from the axil; perianth adnate to ovary and later to the pericarp at least up to the middle, forming in fruit a rather broad band around the circumference; stigmas clavate; seeds horizontal; plants of gypsiferous soils 424. *Bienertia* Bge.
- 10 + Perianth not adnate to ovary or adnate only at the very base; flowers in the leaf axil and if not so the middle fruits vertical 421. *Suaeda* Forsk.
- 29. All or at least the 2 outer segments of the mature fruiting perianth bearing winglike outgrowths, these sometimes reduced to small tubercles or, if none, the fruit surpassing the perianth and leaves opposite 30.
- + Segments of fruiting perianth wingless 47.
- 30. All leaves and branches opposite 31.
- + At least the uppermost leaves and branches in inflorescence alternate 36.
- 31. Fruit horizontal 32.
- + Fruit vertical 35.
- 32. Annual, mostly yellowish-green, scabrous plants; leaves spiny-tipped; wings rather thick, not pellucid 429. *Horaninowia* F. et M.
- + Trees, shrubs, or undershrubs, rarely annuals and then shoots smooth; wings thin and hyaline 33.
- 33. Perianth emarginate; leaves succulent, obtuse; ovary with 2 broad sessile stigmas 430. *Seidlitzia* Bge.
- + Perianth not emarginate; leaves point-tipped or scalelike; ovary mostly with 5 stigmas 34.
- 34. Flowering branchlets borne on branches of the preceding year; flowers in lower nodes of these branchlets, sometimes all the way up; staminodes thin, eglandular; mostly trees or small shrubs 436. *Haloxylon* Bge.
- + Flowering branchlets borne on green shoots of the current year or arising directly from the ground; flowers in the upper nodes of the shoots; staminodes always thickened at the margin and mostly glandular or glandular-fringed; undershrubs or small shrubs 434. *Arthrophytum* Schrenk.
- 35. Perennials or subshrubs (see *A. micradena*), mostly with fragile shoots, with a tuft of hairs in the axils; anthers not appendiculate or obsoletely apiculate 433. *Anabasis* L.
- + Annuals; anthers variously apiculate 432. *Girgensohnia* Bge.
- 36. Only 2 outer segments of fruiting perianth, rarely 3 (*Ofaiston*) bearing winglike appendages, these sometimes reduced to tubercles; plants always annual 37.
- + All 5 segments winged, the wings often unequal 40.
- 37. Three outer segments with rudimentary wings; stamen 1, rarely 2; plants covered with 2-tipped linear scales; lower leaves linear, the upper ones scalelike 431. *Ofaiston* Rafin.

- + Two outer segments winged; stamens 5; indument of simple hairs or none 38.
38. Wings scarious, overlapping at the margins, caducous near the base along a definite line, thus leaving auricles on the perianth segments; anther-appendages narrowly conical, pointed 442. *Piptoptera* Bge.
- + Wings or winglike tubercles markedly discontinuous at the margins, not caducous, bladder-shaped, obtuse 39.
39. Wings scarious, borne below the middle of perianth segments, these not indurated in fruit; anther-appendages yellow roseate, always broad, galeate or fungiform; bracteoles leaflike, rather loosely covering the flower. Caucasus 443. *Halanthium* C. Koch.
- + Winglike outgrowths tuberculate, borne about the middle of the outer perianth segments, becoming cartilaginous in fruit; anther-appendages purple, clavate or oblong-oval; bracteoles broad, gibbous below, tightly enclosing the flower on all sides except sometimes at the summit 441. *Halotis* Bge.
40. Undershrubs; flowers in groups of several at the ends of branches, forming in fruit indurated heads surrounded by a 2- to several-leaved involucre 447. *Sympegma* Bge.
- + Flowers not aggregated in heads 41.
41. Winglike outgrowths at the tips of perianth segments; anthers not appendiculate; lobes of hypogynous disk glandular 42.
- + Winglike outgrowths at or somewhat below or but slightly above the middle of perianth segments 43.
42. Perianth readily caducous in fruit; stamens 2—5; annual plants 446. *Halogeton* C. A. M.
- + Undershrub; stamens 5; perianth not readily caducous 435. *Iljinia* Eug. Kor.
43. Wings subcoriaceous, quite opaque; stigmas subcapitate, on a barely perceptible style. A hispid annual . . . 429. *Horaninowia* Fisch. et Mey.
- + Wings scarious, semipellucid; stigmas sometimes not capitate (see, however, under *Aellenia* Ulbrich) 44.
44. Leaves broad, ovate or orbicular, flat, decurrent; stigmas ovate, sessile 427. *Aellenia* Ulbrich.
- + Leaves always narrow, semiterete; stigmas different from the above 45.
- 12 45. Ovule and seed occupying only the lower part of ovary and pericarp, respectively. Undershrub densely beset with long acicular leaves (Kara-Tau) 428. *Rhaphidophyton* Iljin.
- + Ovule and seed completely filling the ovary and pericarp 46.
46. Perianth several times as long as broad; branches often spinescent; fruit always vertical 426. *Noaea* Moq.
- + Perianth at most twice as long as broad; branches never spinescent; fruit variously oriented 425. *Salsola* L.
47. Perianth 5-parted, concealed in a tuft of axillary hairs, one of its segments long-beaked in fruit; stamens 1—5, unappendaged; leaves small, close together 445. *Cornulaca* Del.
- + None of the perianth segments beaked; anthers always appendiculate 48.
48. A small compact undershrub with small, sessile, tightly packed leaves; perianth greatly accrescent and becoming inflated in fruit; appendages of anthers linear, firm 437. *Nanophyton* Less.

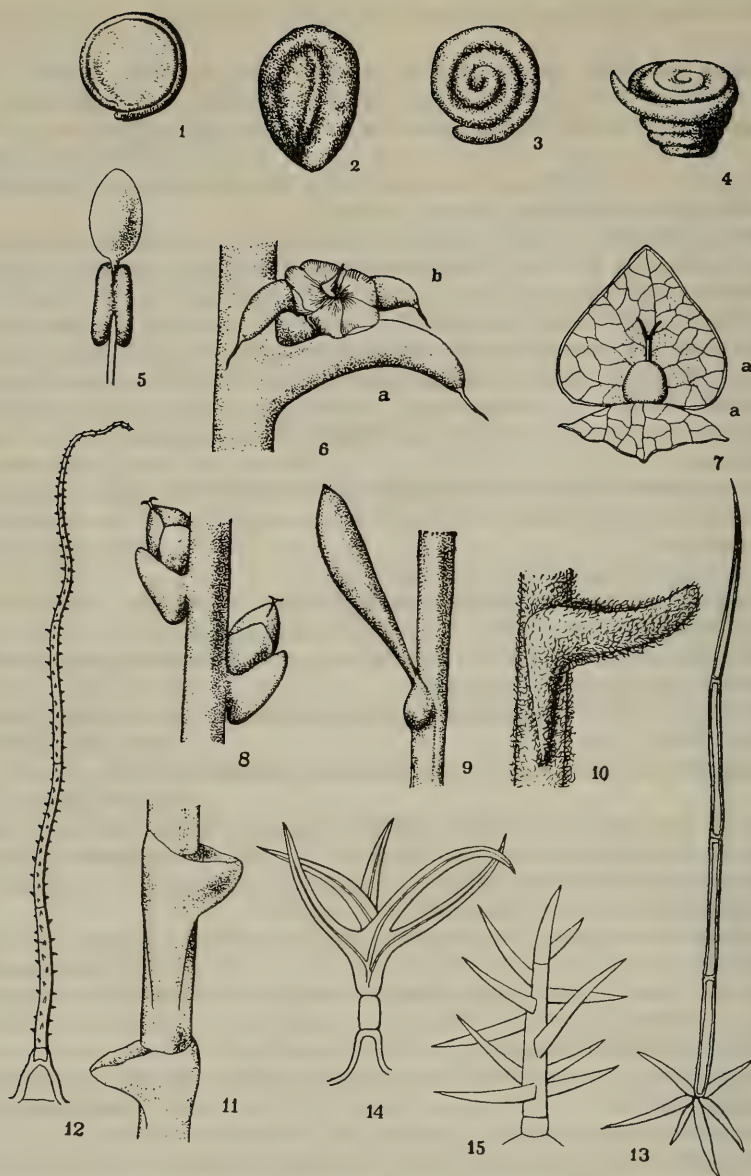


PLATE 1. 1. Seed with annular embryo, *Atriplex sphaeromorpha* Iljin. — 2. Seed with hippocrepiform embryo, *Kochia laniflora* (S. G. Gmel.) Borb. — 3. Spiral embryo, *Suaeda baccifera* Pall. — 4. Spiral embryo, *Salsola kali* L. (after Ulbrich). — 5. Stamens with bladder appendage in species of section *Physurus* Iljin of the genus *Salsola* L. — 6. Flower in the axil of bracteal leaf bract (a) with two lateral bracteoles (b) in the genus *Salsola* L. — 7. Pistillate flower without perianth subtended by two large bracteoles (a) in *Atriplex* sp. (after Ulbrich). — 8. Bracts in section *Caroxylon* Iljin of the genus *Salsola* L. — 9. Leaf shape in section *Anchophyllum* Iljin of the genus *Salsola* L. — 10. Decurrent leaf in section *Physurus* Iljin of the genus *Salsola* L. — 11. Decurrent leaf in the genus *Kalidium* Moq. — 12. Jointed serrated hair of *Kirilowia eriantha* Bge. (after Ulbrich). — 13. Stellate hair of *Axyris amarantoides* L. — 14. Stellate hair of *Eurotia ceratoides* C. A. M. — 15. Branched hair of *Agriophyllum* (after Ulbrich).

- + Annuals (in USSR flora); fruiting perianth only slightly accrescent, not inflated; appendages of anthers scarious or bladdery. 49.
- 49. Number of stamens often unlike that of perianth segments; anther appendages scarious, smooth, 2- or 3-toothed, often coherent; hairs always 2-tipped 438. *Petrosimonia* Bge.
- + Stamens and perianth segments always 5; anther appendages bladdery, of various shapes, or scarcely inflated and then covered with minute prickles (strong magnification!), never coherent; hairs simple . . . 50.
- 50. Segments of fruiting perianth completely united in lower part, becoming indurated cartilaginous and acquiring an ampullaceous or broadly lageniform shape 440. *Halimocnemis* C. A. M.
- + Segments of fruiting perianth not becoming indurated, not united, and not acquiring the shape indicated above 51.
- 51. Bracts (not bracteoles!) opposite or subopposite, connate; leaves terminating in a short conical spinule; anther appendages naked 444. *Gamanthus* Bge.
- + Bracts alternate, not connate; leaves terminating in a tuft of jointed bristles; anther appendages with minute prickles as referred to earlier. 439. *Halocharis* Moq.

II. Key to Genera

- 1. Trees, shrubs, undershrubs, or perennial herbs 2.
- + Annual or biennial plants 31.
- 2. Leaves or scales replacing them and branches opposite up to the summit 3.
- + At least the upper leaves, scales, and branches alternate. 8.
- 3. Shrub with milky-white ligneous branchlets; leaves succulent, subclavate, the uppermost distinctly tubercled at base. Afghan border 430. *Seidlitzia* Bge.
- + Differing from the above 4.
- 4. Flowers small, immersed in the fleshy inflorescence axis; leaves obsolete; a characteristic feature consists in a decurrent vertical serial row of buds; segments of fruiting perianth devoid of winglike outgrowths 5.
- + Flowers solitary or in groups in the axils of leaves or scales, not immersed in the inflorescence axis; segments of fruiting perianth with winglike outgrowths 6.
- 5. Glabrous plants forming compact hemispherical clumps on salinas, takyrs,* and puffic solonchaks mostly almost devoid of other vegetation 419. *Halocnemum* M. B.
- + Undershrub, not forming such hemispherical clumps, mostly rough with minute tubercles, growing on set solonchaks . . . 418. *Halostachys* C. A. M.
- 6. Fruit and seed oriented vertically in relation to the flower axis 433. *Anabasis* L.
- + Fruit and seed horizontal 7.
- 7. Low trees or shrubs at least waist-high; leaves obsolete or reduced to pointed scales; wood heavy, sinking in water . . . 436. *Haloxylon* Bge.

* [Clay-surfaced desert.]

- + Undershrubs or small shrubs, never more than 70 cm high; leaves terete, often very small 434. *Arthropytum* Schrenk.
- 8. Trailing sylvatic plants, with deeply cordate leaves. Caucasus 398. *Hablitzia* M. B.
- + Plants of steppes, deserts, or coasts; very rarely ruderal plants with erect stems and with leaves differing from the above 9.
- 9. Succulent glabrous plants with obsolescent leaves reduced to a fleshy tubercle or somewhat longer, terete, and decurrent as a fleshy sheath (Plate I, Figure 11); inflorescence spikelike, the small flowers immersed in the axis 416. *Kalidium* Moq.
- + Plants different from the above 10.
- 10. Leaves flat, sometimes terete 11.
- + Leaves semiterete, terete, or subulate, very rarely flat and then filiform or linear 16.
- 11. Leaves terete or ovate, entire, sessile, clasping, decurrent 427. *Aellenia* Ulbrich.
- + Leaves not clasping 12.
- 12. Leaves oval or oblong, entire, covered especially on the undersurface with stellate hairs (Plate I, Figure 14) 404. *Eurotia* C. A. M.
- + Glabrous or merely farinose plants 13.
- 13. Agreeably scented or fragrant plants (if the inflorescence is rubbed) 400. *Chenopodium* L.
(*C. ambrosioides* and *C. frutescens*).
- + Inodorous plants 14.
- 14. Desert undershrubs; leaves cinereous-silvery with heavy mealy efflorescence, mostly entire 403. *Atriplex* L.
(*A. cana*, *A. turcomanica*, and *A. verrucifera*).
- + Herbaceous perennials with green leaves 15.
- 15. Leaves distinctly hastate; perianths not united. Plants of W. part of European USSR 400. *Chenopodium* L.
(*C. Bonus henricus*).
- 17 + Segments of fruiting perianth fused in groups [glomerules] (Plate II, 2, 3, 5). Transcaucasia and Black Sea coast in Crimea and in European part of the USSR 399. *Beta* L.
- 16. A small undershrub of the Alai Range; leaves closely approximate, subulate to subtrigonal, glabrous, 10—20 mm long; bracteoles whitish-hyaline, lanceolate; anatomic structure of the stem normal 397. *Polycnemum* L. (*P. perenne*).
- + Leaves different; stem with concentric alternation of xylem and phloem 17.
- 17. A small undershrub of gravelly soils, forming a compact and rigid cushion; leaves short, fleshy, subulate, point-tipped, dilated at base, completely covering the stem 437. *Nanophyton* Less.
- + Plants different from the above 18.
- 18. The uppermost leaves, especially the bracteal, decurrent at base into a small tubercle firmly appressed to the stem (Plate I, 8); plants with normal hairs or glabrous 425. *Salsola* L. (Section *Caroxylon* Iljin).
- + Leaf base not tubercled or, if tubercled, the plant furnished with 2-tipped scales 19.

19. Young parts, especially the globular buds, covered with 2-tipped, pointed, pellucid scales (Plate XIII, Figure 4). 425. *Salsola* L. (*S. gemmascens* and *S. nodulosa*).
 + Plants glabrous or hairy, not lepidote 20.
20. Plants glabrous or roughened with very short prickles (the stem sometimes covered at summit with scattered very short slender hairs) 21.
 + Plants hairy at least on the young shoots, the hairs sometimes very short, appearing as a powdery bloom 28.
21. Leaves narrowed at base or distinctly constricted above a tubercle-like base 22.
 + Leaves sessile, without attenuation or constriction or slightly dilated at base 24.
22. Leaves contracted at base into a very short petiole; bracteoles scarious, pellucid 421. *Suaeda* Forsk.
 + Leaves distinctly constricted above an enlarged base, abscission taking place at the constriction (Plate I, Figure 9); bracteoles herbaceous or rarely wanting 23.
23. Flowers in heads of several at the ends of branches, becoming indurated in fruit and surrounded by an involucre of 2- or several terminal leaves, these united at base (Plate XIV, Figure 8). Central Tien Shan and E. Pamir-Alai 447. *Sympegma* Bge.
 + Flowers solitary, bracteolate, disposed in ebracteate spikelike inflorescences 425. *Salsola* L. (Section *Anchophyllum* Iljin).
24. Leaves obtuse, subclavate at apex, arched-upcurved (Plate X, Figure 8); branches readily falling off at basal joints 435. *Iljinia* Eug. Kor.
 + Leaves acute, acuminate, or point-tipped; branches not deciduous 25.
25. Leaves bluntly trigonous, acicular, spinescent, scarcely dilated at base, densely disposed, upright; shoots (especially the leaves) always purple in the middle or the upper part (Plate XIII, Figure 8). Kara-Tau Mountains 428. *Rhaphidophyton* Iljin.
 + Leaves different from the above; shoots sometimes not purple, always annual 26.
26. Plants yellowish-green throughout, with scant short indument in upper part; leaves numerous, erect, closely approximate on the vegetative branchlets; branches straight, erect. Dagestan 425. *Salsola* L. (*S. daghestanica*).
 + Glaucous or dark green plants. Central Asia, Transcaucasia 27.
27. Leaves slender, filiform, not more than 0.5 mm in diameter; branches mostly terminating in a spine; fruit vertical (Plate XIII, Figure 7) 426. *Noaea* Moq.
 + Leaves thicker, 1—2 mm in diameter, very rarely 0.75 mm; spines sometimes wanting; flowers caducous; fruit horizontal 425. *Salsola* L. (Section *Sphragidanthus* Iljin).
28. Leaves borne on a very short petiole (not dilated at base), mostly glaucous, botuliform; inflorescence branches often displaced from the axil onto the petiole; bracteoles always hyaline 421. *Suaeda* Forsk. (*S. microphylla* and *S. dendroides*).

- + Leaves always sessile; flowers and inflorescence branches always strictly axillary; bracteoles wanting or herbaceous (except *Suaeda physophora*, and then the young shoots pulverulent with papilliform chaff, leaf scars conspicuously impressed, ligneous twigs whitish, and inflorescence terminal) 29.
- 29. Bracteoles always wanting; embryo annular 30.
- + Bracteoles always present; embryo spiral; segments of fruiting perianth with winglike outgrowths 425. *Salsola* L. (Section *Belanthera* Iljin, *S. roshevitzii* and *S. baranovii*).
- 19 30. Perianth 4-merous, wingless in fruit 407. *Camphorosma* L.
- + Perianth 5-merous, winged in fruit 412. *Kochia* Roth.
- 31. All leaves opposite or plants leafless 32.
- + Leaves alternate, only the lower ones opposite or verticillate 42.
- 32. Plants quite leafless, with jointed often reddish succulent stem and fleshy spikelike inflorescences. Wet solonchaks . . . 420. *Salicornia* L.
- + Leaves always developed 33.
- 33. Leaves always flat 403. *Atriplex* L. (*A. hastata* and *A. flabellum*).
- + Leaves semiterete or terete 34.
- 34. Plants glabrous or merely covered with acute tubercles or minute prickles 35.
- + Plants with normal hairs 40.
- 35. Plants quite glabrous 36.
- + Plants rough with acute tubercles or prickles 39.
- 36. Leaves obtuse, without cusp or seta, very succulent; stem whitish; fruiting perianth with bright red wings. Transcaucasia 430. *Seidlitzia* Bge. (*S. floribunda*).
- + Leaves acute, acuminate, cuspidate, or aristate 37.
- 37. Internodes longitudinally plicate with 4 deep furrows, of these one pair below the leaves, the other between them 433. *Anabasis* L. (*A. micradena*).
- + Internodes not furrowed as above 38.
- 38. Glaucous plants with 4-angled branches; leaves subulate, mucronate, the upper ones broad-ovate, closely approximate, appressed to stem; fruiting perianth 2-winged. Zeravshan, Fergana Valley 432. *Girgensohnia* Bge. (*G. diptera*).
- + Stem terete; leaves terete, acuminate, spreading; fruiting perianth wingless 438. *Petrosimonia* Bge. (*P. sibirica*).
- 39. Inflorescences spikelike; fruiting perianth with scarious wings (Plate XIV, Figure 2). 432. *Girgensohnia* Bge.
- + Inflorescences globose, spiny; fruiting perianth with short subcoriaceous winglike outgrowths (Plate IX, Figures 1-2) 429. *Horaninowia* Fisch. et Mey.
- 20 40. Plants commonly vested with 2 kinds of hairs: dense, short, and appressed, as well as scattered, long, and jointed (the latter especially about the leaf axils); segments of fruiting perianth winged; leaves subtending the flowers alternate . . . 425. *Salsola* L. (*S. brachiata*).
- + All hairs alike; segments of fruiting perianth wingless; all leaves strictly opposite 41.

41. Stem and leaves covered with closely appressed crisp hairs; leaves obtusish, terminating in a caducous tuft of bristles. Fergana Valley . . . 444. *Gamanthus* Bge. (*G. ferganicus*).
+ Stem and leaves covered with appressed or spreading straight hairs; leaves acuminate, without a tuft of bristles . . . 438. *Petrosimonia* Bge.
42. Plants vested with stellate, branched, or 2-tipped hairs or scales at least in their upper part or on the bracteoles, rarely simple hairs and shorter branched ones occurring on the same plant 43.
+ Plants vested with simple smooth or serrulate (Plate I, Figure 12) hairs, very rarely glandular-hairy or quite glabrous 49.
43. Plants densely clothed with minute short-branched hairs as well as long spreading serrated and jointed ones; fruiting perianth with winglike outgrowths. Afghan border 425. *Salsola* L. (*S. vvedenskyi*).
+ Plants with hairs or scales of one type 44.
44. Lowest leaves linear-terete, obtuse, wilting, all the others scalelike, hence the stem apparently leafless; plants covered with appressed 2-tipped asymmetrically attached scales (Plate XIV, Figure 1). Wet solonchaks 431. *Ofaiston* Rafin.
+ All leaves developed and alike; hairs not squamaceous 45.
45. Plants clothed with 2-tipped hairs; leaves semiterete or terete, mostly more or less fleshy. Solonchaks, solonetzes, or ruderal sites 438. *Petrosimonia* Bge.
+ Plants clothed with branched, bushy or stellate hairs; leaves flat or more rarely subterete by involution of margins, but not terete or fleshy 46.
46. Hairs stellate, sometimes with a long simple articulate hair arising from the center (Plate I, Figure 13). More or less ruderal or weed plants 47.
+ Hairs branched or bushy (Plate I, Figure 15). Arenarious plants . . 48.
- 21 47. Leaves filiform, linear, or rarely lance-linear, spiny-tipped, narrowed toward base, at the croches opposite or even in 3's; fruits resembling those of shepherd's purse, distributed all over the plant 405. *Ceratocarpus* L.
+ Leaves short-petioled, narrowly lanceolate to ovate-lanceolate, acute or acuminate but not spiny-tipped, all alternate; inflorescences terminal; fruits without cornute outgrowths 406. *Axyris* L.
48. Plants very rigid; leaves narrowing toward base, with 3—15 longitudinal veins, sometimes petiolate and then the blade rounded or subcordate, spiny-tipped; inflorescences compact, spiciform-capitate, axillary, stiff-spiny (Plate VII, Figure 7) . . . 414. *Agriophyllum* M. B.
+ Plants less rigid; leaves filiform to linear, rather inconspicuously 1—3-veined, not spinescent; inflorescences spikelike, mostly elongated, terminal, not spiny 413. *Corispermum* L.
49. Very succulent plants; leaves fleshy, with subglobose or thick orbicular blade, clasping, with a decurrent adnate sheath; inflorescences spike-like; flowers immersed in the fleshy inflorescence axis, subtended by short fleshy bracts, these broadly semiorbicular at the free end, decurrent and adnate to stem (Plate VIII, Figure 2). Salinas and takyrs. 417. *Halopeplis* Bge.

- + Plants different from the above 50.
- 50. Plants cultivated as truck or field crops 51.
- + Wild or ornamental plants 53.
- 51. A root crop. Root stout, napiform or raphaniform, red or white or yellow 399. *Beta* L.
- + A leafy vegetable or a grain crop; root short, funiform 52.
- 52. A vegetable grown for its foliage; plants 25—50 cm tall, glabrous, mostly dioecious 402. *Spinacia* L.
- + Plants grown for grain, 40—100 cm tall, mostly farinose; leaves broadly triangular to oblong-triangular, commonly 3-lobed; flowers perfect 400. *Chenopodium* L. (*C. quinoa*).
- 53. A low branched plant with flat lance-linear leaves; flowers borne in crotches of stem and branches in the larger leafless upper part of the plant composed of branches terminating in slender spines. E. Siberia, European part of the USSR 400. *Chenopodium* L. (*C. aristatum*).
- 22 + Plants different from the above 54.
- 54. Glomerules or inflorescence branches displaced from the leaf axil onto the petiole; plants always glabrous, with linear or filiform leaves and hyaline bracteoles see stage 28 of Key I.
- + Flowers and glomerules or inflorescence branches axillary 55.
- 55. Leaves lanceolate to suborbicular, at least the lower ones always flat 56.
- + Leaves filiform or linear or else semiterete or terete, very often fleshy 62.
- 56. Glabrous plants 57.
- + Hairy plants; leaves showing in transmitted light a mosaic pattern of green and colorless portions 61.
- 57. Yellowish-green plants, never farinose, rather rigid, with 2 arched-veined spiny-tipped basal and spiniform cauline leaves; inflorescences in spiny heads. Sands . . . 414. *Agriophyllum* M. B. (*A. palezkianum*).
- + Plants not rigid and not spiny, often farinose or cinereous-silvery; inflorescences different 58.
- 58. Dioecious plants; lower leaves with very long petioles, runcinate or pinnatipartite; fruits sessile, in the axils or all cauline and sometimes also radical leaves. Transcaucasia and Central Asia 402. *Spinacia* L.
- + Monoecious plants or the flowers perfect; leaves different from the above; flowers in terminal panicles, often also in the axils of upper leaves 59.
- 59. Leaves oblongly rhombic-hastate, petiolate, with horizontal or upturned auricles; petioles of lower leaves many times the length of the blade; perianth of 1 segment; bracteoles none. Plants of the extreme north (Arctic) 401. *Monolepis* Schrad.
- + Plants different from the above 60.
- 60. Flowers unisexual; pistillate flowers enclosed in 2 bracteoles, destitute of perianth (Plate I, Figure 7); seed coat yellow, soft 403. *Atriplex* L.
- + Flowers perfect, rarely intermixed with pistillate ones, all with a perianth and sometimes ebracteolate; seed coat black, brittle 400. *Chenopodium* L.

61. Segments of fruiting perianth with hooklike appendages (Plate V, Figure 13) 411. *Echinopsilon* Moq. (*E. hyssopifolius*).
- 23 + Fruiting perianth not so appendaged see stage 22 of Key I.
62. Stems with normal anatomic structure; leaves stiffish, 3-angled, acicular, spinescent, 3—20 mm long, not more than 0.5 mm in diameter, sessile, closely disposed on the branches and on the stem; low plants, 3—20 cm in height; flowers solitary in the leaf axils, very small, with 2 lateral lanceolate, scarious bracteoles; seed coat black, brittle, granular 397. *Polycnemum* L.
- + Stem showing in cross section a concentric alternation of xylem and phloem 63.
63. Plants glabrous or rough with acute tubercles or short prickles . . . 64.
- + Plants with true hairs at least on the young parts 78.
64. Bracteoles small, thin, scarious, semipellucid; plants mostly succulent; flowers in axillary glomerules forming a paniculate or spikelike inflorescence. Plants of wet and puffy solonchaks and salinas 421. *Suaeda* Forsk.
- + Bracteoles always herbaceous or wanting 65.
65. Leaves flat even when very narrow, sometimes involute and then apparently terete 66.
- + Leaves trigonous, subulate, terete, semiterete, or claviform, often succulent 69.
66. Perianth small, of 1—5 thin white-scarious segments; inflorescence slenderly spiciform; fruits vertical, round, compressed, mostly winged; leaves sessile or merely narrowing gradually toward base without a distant petiole 67.
- + Perianth always herbaceous or sometimes wanting in pistillate flowers, enclosed in a pair of bracteoles; fruits wingless; leaves distinctly petiolate 68.
67. Perianth regularly and deeply 5-parted, as long as or scarcely shorter than the subtending leaves; stamens 5. Transcaucasia, Kopet Dag, Naryn River valley 415. *Anthochlamys* Fenzl.
- + Perianth of 1 segment, more rarely of 3—5 unequal segments, shorter than subtending leaves; stamens 1—5 413. *Corispermum* L.
68. Leaf axils with a tuft of hairs; leaves appearing variegated in transmitted light due to alternation of green and colorless portions 412. *Kochia* Roth (*K. scoparia*).
- + Leaf axils hairless; plants often farinose; leaves monochromatic see stage 60.
- 24 69. Leaves obtuse, not pungent-tipped 70.
- + At least the upper leaves acuminate, acute, mucronate, or pungent . . . 73.
70. Leaves subtending the flowers broadly rounded at apex, much shorter than individual flowers (especially in fruit); perianth segments terminating in a long point; small, densely branched plants (Plate XVII, Figure 6). 440. *Halimocnemis* C. A. M. (*H. karelini*).
- + Leaves subtending the flowers and perianth segments different from the above 71.
71. Glaucous succulent plants, usually turning black in drying; leaves obtuse, often claviform, not decurrent; anthers unappendaged 425. *Salsola* L. (*S. foliosa* and *S. mutica*).

- + Leaves not claviform, slightly decurrent (Plate I, 10); appendages of anthers bladdery (Plate I, Figure 5) 72.
72. Bracteal leaves and bracteoles mucronate; appendages of anthers fungiform, yellow, borne on a long tortuous stipe; fruiting perianth 2-winged. S. Transcaucasia 443. *Halanthium* C. Koch. (*H. rariflorum*).
- + All leaves, including the bracteal, obtuse; appendages of anthers oval or ovate, roseate or whitish, borne on a very short stipe; fruiting perianth 5-winged 425. *Salsola* L. (Section *Physurus* Iljin).
73. Lower and middle leaves obtuse, the upper ones mucronate or with a caducous bristle from the obtuse apex 74.
- + All leaves acuminate, acute, or mucronate 75.
74. Leaves without a bristle; fruiting perianth not caducous, 2-winged; anthers with a yellow fungiform appendage on a very long tortuous stipe. S. Transcaucasia 443. *Halanthium* C. Koch.
- + All leaves terminating in a caducous bristle; fruiting perianth readily caducous, with 5 winglike appendages. Central Asia (Plate XIV, Figure 6). 446. *Halogeton* C. A. M.
75. Stiff glaucescent plants, 3—20 cm tall; leaves closely approximate, subulate, rough, arched-recurved; inflorescence spikelike; perianth with 5 winged outgrowths; fruit vertical. Transcaucasian border area 426. *Noaea* Moq. (*N. minuta*).
- + Plants different from the above 76.
76. Plants 3—20 cm tall; leaves 10—50 mm long, terminating in a short stiff thick-based cusp; perianth 4-merous, wingless in fruit, the strongly indurated perianth segments united into an ampullaceous body with a distinct convex cross at the bottom (Plate XVII, Figures 2, 4) 440. *Halimocnemis* C. A. M. (*H. sclerosperma*).
- 25 + Leaves slenderly bristle-tipped; perianth 5-merous, always with winged outgrowths in fruit, not ampulliform 77.
77. Small plants densely covered with leaves; segments of fruiting perianth bearing small whitish, thickish, opaque winglike outgrowths; stigma capitate. Southern Kyzyl-Kum and Kara-Kum deserts 429. *Horaninowia* Fisch. et Mey.
- + Stigma not capitate; perianth segments mostly with thin semitransparent wings, rarely as in the preceding 425. *Salsola* L. (Section *Kali* Ulbr. and *S. iliensis*).
78. Bracteal leaves slightly extended downward into a tubercle appressed to the stem (Plate I, Figure 8). 79.
- + Bracteal leaves not extended at base 81.
79. Leaves acuminate 425. *Salsola* L. (*S. forcipitata*).
- + Leaves obtuse 80.
80. The upper part of the plant, especially in the perianths, farinose 425. *Salsola* L. (Section *Aleuranthus* Iljin).
- + Plants not farinose 425. *Salsola* L. (Section *Caroxylon* Iljin).
81. Plants very leafy; leaves cylindric, obtusish, those at the base of the stem wrapped in hairs, all covered with very short branched hairs and long jointed bristles; fruiting perianth with winglike outgrowths. Border area adjoining Afghanistan 425. *Salsola* L. (*S. vvedenskyi*).

- + Plants different from the preceding, devoid of branched hairs 82.
- 82. Leaves obtuse 83.
- + Leaves point-tipped 97.
- 83. Leaves, especially the smaller ones, on reduced branchlets in the leaf axils of the main stem, terminating in a tuft of spreading jointed bristles (Plate XIV, Figure 7) 439. *Halocharis* C. A. M.
- + Leaves sometimes without a terminal tuft of spreading bristles . . . 84.
- 84. Plants strongly divaricately branched; stems and branches slender, mostly lustrous, dark brown, zigzag-bent; buds ampullaceous or obconic, densely enveloped in long tangled hairs; fruiting perianth with 5 orange or red wings. Turkmenia (Plate XII, Figure 1) 425. *Salsola* L. (*S. gossypina*).
- + Plants different from the preceding, without such buds 85.
- 26 85. A relatively stout, strongly branched plant; bracts rounded at the margin, much shorter than perianth, especially in fruit; fruit lageniform, in the enlarged part stony, in upper part gullet-shaped and scarious (Plate XVII, Figure 6) 440. *Halimocnemis* C. A. M. (*H. karelini*).
- + Plants different from the preceding 86.
- 86. Hairs on the stem horizontally spreading 87.
- + Hairs on the stem contorted, crisp, or tangled, or the indument arachnoid (see, however, under *Salsola affinis*, stage 93) 90.
- 87. Leaves subcylindric, slightly decurrent (Plate I, Figure 10); hairs mostly of two contrasting types; relatively sparse long hairs over a dense lining of short ones; appendages of anthers bladdery, roseate or purple, exserted (Plate I, Figure 5); fruiting perianth, including its 5 large wings, 10—17 mm in diameter 425. *Salsola* L. (Section *Physurus* Iljin).
- + Leaves not decurrent; hairs largely of one type; anthers unappendaged; winglike appendages, if present, much smaller 88.
- 88. Leaves flat, oblong-oval, variegated (in transmitted light) with alternating green and colorless portions; the spreading hairs on the stem 3—5 mm long 408. *Panderia* Fisch. et Mey. (*P. turkestanica*).
- + Leaves cylindric; hairs on the stem mostly 0.5—3 mm long, rarely longer 89.
- 89. Outgrowths on segments of fruiting perianth winglike. Altai (Chuya Steppe) 412. *Kochia* Roth. (*K. krylovii*).
- + Outgrowths on segments of fruiting perianth aculeiform or tubercle-shaped, in the latter case the axis of inflorescence slightly helical 411. *Echinopsilon* Moq. (*E. divaricatus* and *E. hirsutus*).
- 90. Plants enveloped in a cover of smooth arachnoid hairs which partly disappear in time; leaves small, 2—10 mm long, at the very slightly dilated base half-clasping and broadly scarious-margined; fruiting perianth with 5 winglike outgrowths at summit, caducous. E. part of Central Asia 446. *Halogeton* C. A. M. (*H. arachnoideus*).
- + Stem and leaves hairy, but not cobwebby, the hairs always rough with minute tubercles or prickles (strong magnification!) 91.
- 91. Leaves slightly decurrent (Plate I, Figure 10); appendages of anthers bladdery 92.

- + Leaves not decurrent; appendages of anthers mostly none or very small, flat, and scarious 93.
- 27 92. Appendages of anthers long-stipitate; fruiting perianth with 2 winglike outgrowths. Transcaucasia 443. *Halanthium* C. Koch.
- + Appendages of anthers with a very short stipe (Plate I, Figure 5); fruiting perianth 5 winglike outgrowths, of these often 3 large and 2 obsolescent. 425. *Salsola* L. (Section *Physurus* Iljin).
- 93. Plants strongly branched near the base, the branches whitish, mostly slender, approximate, mostly arcuate near base, puberulent, subsequently glabrescent; leaves thickish, not less than 1.5 mm in diameter, terete, at the slightly enlarged base scarious-rimmed, mostly recurved from the downward bulging base, in the axils with branchlets reduced to a leafy cluster 425. *Salsola* L. (*S. affinis*).
- + Plants different from the preceding; leaves flattish or cylindric and then not more than 1 mm thick, not enlarged or attenuated below and without such curvatures; bracteoles wanting 94.
- 94. Plants clavate at the summit; perianth of 4 segments, without outgrowths in fruit 407. *Camphorosma* L.
- + Stem not distinctly claviform at the summit (see, however, under *Echinopsilon sedoides*); perianth of 5 segments, with out-growths in fruit. 95.
- 95. Outgrowths of perianth winglike 96.
- + Outgrowths tubercled or spiny; flowers and fruits borne laterally at the leafy base 411. *Echinopsilon* Moq.
- 96. Fruiting perianth bearing above the rings 5 tuberclelike outgrowths corresponding to each lobe; fruit vertical. S. Transcaucasia. 408. *Panderia* Fisch. et Mey. (*P. pilosa*).
- + All outgrowths of perianth winglike; fruit horizontal 412. *Kochia* Roth.
- 97. Stems slender; leaves opposite, only the uppermost bracteal ones alternate; fruiting perianth 5-winged 425. *Salsola* L. (*S. brachiata*).
- + Leaves alternate, only the lowermost 1 or 2 pairs opposite 98.
- 98. Plants clothed, especially when young, with smooth cobwebby hairs; leaves small, obtuse or some terminating in a barely perceptible acutish tubercle; segments of the caducous fruiting perianth bearing at the summit 5 thin scarious winglike outgrowths. E. part of Central Asia 446. *Halogeton* C. A. M. (*H. arachnoideus*).
- 28 + Plants different from the preceding 99.
- 99. Leaves very closely approximate, small, on the upper part of the stem and on the branches not more than 4—12mm long, rough, gradually tapering to a slender spinule or terminating in a slender prickle . . . 100.
- + Leaves less closely disposed and longer, not rough, terminating in a short spinule strongly enlarged at base 101.
- 100. Upper part of the stem and branches covered with short glandular hairs; leaves gradually tapering to a spinule, with a tuft of hairs in the axils; perianth without winglike outgrowths 445. *Cornulaca* Del.
- + Glandular hairs wanting; leaves more abruptly terminating in a prickle, without axillary tufts of hairs; fruiting perianth with winglike outgrowths 425. *Salsola* L. (*S. androssovii* and *S. deserticola*).

101. Bracteal leaves opposite or subopposite, strongly enlarged and connate at base, their lower part becoming indurated-cartilaginous, the upper part extended into a rather long attenuated summit resembling crab's open claws (Plate XVI, Figure 1) 444. *Gamanthus* Bge.
+ Bracteal leaves alternate, not connate, different from the above. . . 102.
102. Hairs of one type, closely appressed; leaves subtrigonus; perianth segments 5, of these 2 broader, 2-nerved, bearing in fruit a large wing which falls off readily at its basal joint, the margins of the two wings overlapping; appendages of anthers scarious. 442. *Piptoptera* Bge.
+ Hairs mostly of two types: short, spreading hairs and scattered long jointed ones, these either spreading or subappressed, or rarely quite appressed and then leaves almost flat; perianth segments always wingless, united in fruit into an ampullaceous or lageniform body which becomes indurated and almost stony in its lower enlarged part; appendages of anthers bladdery 103.
103. Plants commonly with a slight purple tinge; bracteoles enclosing the perianth keeled, somewhat gibbous at base in extension of the keel; the two outer segments of fruiting perianth bearing rudiments of winglike outgrowths; appendages of anthers purple 441. *Halotis* Bge.
+ Plants not purple-tinged; bracteoles not gibbous at base; perianth segments without outgrowths; appendages of anthers yellow or whitish. 440. *Halimocnemis* C. A. M.

29 Subfamily 1. **CYCLOLOBEAE** C. A. M. in Ldb. Fl. Alt. I (1829) 370. — Embryo annular or hippocrepiform; albumen developed.

Tribe 1. **POLYCNEMEAE** Dumort. Fl. Belg. (1827) 22. — Flowers perfect; perianth scarious, 5-merous; perianth segments 1-nerved; bracteoles scarious, keeled; stamens united at base into a circular disk; stigmas included in the perianth; ovules with a long funicle; pericarp scarious; seed coat hard. Small plants.

Genus 397. **POLYCNUM*** L.
L.Gen.pl.ed.2 (1742) 21; Sp.pl.ed.1 (1753) 35.

Flowers perfect, small, solitary, with 2 scarious lateral bracteoles; perianth of 5 segments; stamens 3, rarely 1—5, fused at base into a hypogynous disk; stigmas 2, on a short style; fruit vertical, with a thin scarious pericarp, indehiscent; seeds black, with a granular coat. Annuals or undershrubs with alternate subulate sessile leaves. The genus contains altogether 6 species. Russian: khрупляvnik.

1. Undershrubs 5. *P. perenne* Litw.
- + Annuals 2.

* A plant name occurring in the writings of the Greek author Nicandros, derived form "polis," many, and "cnemis," hip, thigh.

2. Lower branches ca. 2 mm in diameter at base; leaves mostly 10–20 mm long, only on reduced branches 5–10 mm; bracteoles 1.5 times as long as the perianth; seeds 1.5–2 mm long 4. *P. majus* A. Br.
- + Lower branches usually not more than 1 mm in diameter; leaves mostly 3–10 mm, rarely 12 mm long; bracteoles as long as or shorter than the perianth; seeds 1–1.25 mm in diameter 3.
3. Leaves subfiliform, 0.15–0.25 mm in diameter, on the middle part of the stem almost horizontally spreading 3. *P. heuffelii* Lang.
- + Leaves firmer and thicker, obliquely ascending or appressed to the stem 4.
4. Axis of inflorescence strongly zigzagged; leaves closely appressed to the stem 2. *P. verrucosum* Lang.
- + Axis of inflorescence straight or with barely perceptible curvatures 1. *P. arvense* L.

1. *P. arvense* L. Sp. pl. (1753) 35; Fenzl in Ldb. Fl. Ross. III, 860; Shmal'g., Fl. II, 360; Kryl., Fl. Zap. Sib. IV, 879; Il'in in Fl. Yugo-Vost. IV, 129. — *P. vulgare* Pall. It. I (1771) 142. — *P. arvense* β minus Döll 30 Rhein. Fl. (1843) 287. — *P. viaticum* Pall. Ill. pl. (1803) 57 (p. p.). — Ic.: Fedch. and Fl., Fl. Evr. Ross., fig. 244; Taliev, Opr. rast. Evrop. ch., fig. 185. — Exs.: HFR no. 2039 a, b.

Annual, 3–10 cm high, branched from the base, with elongated ascending or decumbent lower branches, rarely simple; stem and branches covered with short crisp hairs, subsequently somewhat glabrescent; leaves glabrous, linear-subulate, 3-angled, spinescent, scarcely enlarged at base 2–4 times the length of flowers, 3–10 mm or rarely to 12 mm long, obliquely ascending, more rarely appressed to the stem; flowers solitary; bracteoles terminating in a long slender point, scarious, as long as or scarcely shorter than the perianth; perianth segments broadly lanceolate, acuminate, slightly keeled and with scattered crisp hairs on the back; stamens mostly 3, rarely 1–5; pericarp thin, scarious, easily detached; seeds oval, compressed laterally, 1–1.25 mm long and 0.75–1 mm broad, black, dull, granular. July–September.

Weed-infested places in pine woods, bluffs, old fields, mostly on sandy soil, also as a component of steppe plant associations. European part: M. Dnp., U. Dnp., V. -Don, Bl., Crim., L. Don, Transv., L. V.; Caucasus: Cisc., Dag., S. and E. Transc.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say. (?); Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh., Pam.-Al., Mtn. Turkm. Gen. distr.: Centr. Eur., Med., Bal.-As. Min. Described from W. Europe. Type in London.

Economic importance. Considered to be a good forage plant (Ulbrich).

2. *P. verrucosum* Lang Syll. pl. Ratisb. I (1824) 179. — *P. arvense* var. *verrucosum* Oborny Fl. Mähren (1885) 334. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 231, fig. 1–5. — Exs.: Rchb. Fl. Germ. exs. no. 583.

Annual; branches elongated, decumbent or ascending, at first with scattered short hairs, subsequently merely rough, to 30 cm long, mostly reddish, in the inflorescence always distinctly zigzagged; leaves trigonous-subulate, appressed to the stem, the lower to 10 mm long, the others mostly 2–4 mm long, 2–3 times the length of flowers in their axils; flowers borne at the flexures of the inflorescence axis, 1.5–1.7 mm long; bracteoles as long as or but slightly shorter than the flowers; seeds resembling those of the preceding species, ca. 1.25 mm long. August–September.

Dry sandy fields, sunny slopes, and steppes. — European part: Bl. (?), L. Don (?), L. V. Gen. distr.: Centr. Eur., Med., Bal.-As. Min. Described from the vicinity of Budapest. Type in Vienna? Cotype in Leningrad.

3. *P. heuffelii* Lang Syll. pl. Ratisb. II (1828) 219. — *P. paradoxum* Schur in Osterr. Bot. Zeitschr. XIX (1869) 148. — *P. arvense* β *heuffelii* Fiek. Fl. Schles. (1881) 372. — *P. arvense* β *filifolium* Neilr. Diagn. (1867) 109. — Ic.: Rchb. lc. Fl. Germ. XXIV, t. 230, fig. 1–5. — Exs.: Fl. Hung. exs. cent. II, no. 133; Fl. exs. reip. Boh.-Slov. no. 308.

31 Annual, 5–25 cm high, pyramidal in shape; branches usually simple, covered with scattered short hairs; leaves very slender, filiform, subtrigonal, acuminate, 5–12 mm long and 0.15–0.25 mm in diameter, strongly and almost horizontally spreading, glabrous, the middle and lower ones 6–10 times the length of flowers; bracteoles long-acuminate, scarious, keeled, as long as or slightly shorter than the perianth, perianth segments oblong-oval, acute; seeds rounded-oval, compressed, 1–1.3 mm long and to 1 mm broad, black, granular. July–September. (Plate II, Figure 1 a–b).

Alluvial sands and sandy fields. — European part: M. Dnp. Gen. distr.: Cent. Eur., Bal. Described from the vicinity of Budapest.

4. *P. majus* A. Br. in Flora XXIV (1841) 151; Fenzl in Ldb. Fl. Ross. III, 860, (p. p.); Shmal'g., Fl. II, 360; Kryl., Fl. Zap. Sib. IV, 879; Il'in in Fl. Yugo-Vost. IV, 130. — *P. arvense* β *majus* Döll Rhein. Fl. (1843) 287. — *P. arvense* α *macrophyllum* Neilr. Fl. Nieder-Österr. (1859) 286 (p. p.). — *P. arvense* var. *longifolium* Neilr. Diagn. (1867) 109 (p. p.). — *P. arvense* var. *simplex* Wallr. Sched. crit. (1822) 25. — *P. viaticum* Pall. Illustr. (1803) 57 (p. p.). — Ic.: Fl. Yugo-Vost. IV, fig. 251. — Exs.: HFR no. 2041; Fl. pol. exs. no. 563.

Annual, 10–20 cm high, branched from the base, with elongated lower branches, glabrous, sometimes rough, the young parts often covered with short crisp hairs; leaves subulate, trigonal, spiny-tipped, at the scarcely enlarged base membranous-margined, 2–8 times the length of flower, 10–20 mm long; bracteoles scarious, ovate-lanceolate, 1-keeled, gradually tapering to a point, 1.5 times as long as the perianth; perianth segments acute, 2–2.5 mm long, 1-nerved, glabrous or at the junction with scattered short crisp hairs; stamens mostly 3, rarely 1–5; seeds oval, 1.5–2 mm long and 1–1.5 mm broad, black, dull or somewhat lustrous, granular. July–September.

Stony, calcareous and chalky slopes, sandy places, and fallows. — European part: U. Dnp. (S.), M. Dnp., U. V. (rare), V.-Don, Bl., Crim., L. Don; Caucasus: Cisc., E., S. and (?) W. Transc.; Centr. Asia: Balkh. (Zaisan), T. Sh. (Talass. Ala Tau), Dzu.-Tarb. Gen. distr.: Centr. Eur., Med., Bal. Described from Germany.

5. *P. perenne* Litw. in Trav. Mus. Bot. Acad. Sc. St. Petersb. VI (1910) 81.

32 Suffrutescent plants, 5–20 cm high, densely caespitose, the branchlets covered with very short crisp hairs; leaves linear-subulate, subtrigonal, acute, glabrous, 10–20 mm long and ca. 0.5 mm broad, spreading; flowers solitary, axillary, sessile bracteoles subtending the flowers laterally, white-scarious, lanceolate, dilated at base, long-acuminate, 1-nerved and keeled, as long as or slightly shorter or barely longer than the perianth;

perianth segments oval to oval-oblong, acute, 1-nerved, overlapping, pubescent on the back especially at base; seeds rounded-oval to subreniform, 1.5–2 mm in diameter, black, somewhat lustrous, granular. May–June.

Taluses, rocks, and argillaceous-gravelly mountain slopes. – Centr. Asia: T. Sh. Endemic. Described from the Alai Range, from the Sogo River valley. Type in Leningrad.

Note. A species very closely related to the Moroccan *P. fontanesii* Dur. et Moq., from which it differs in some rather insignificant characters (glabrous perianth, etc.).

Tribe 2. **HABLITZIEAE** Ulbrich in Engl. u. Prantl, Pflanzenfam. 2. Aufl. 16 c (1934) 455. – Flowers free, with superior ovary; perianth not becoming indurated or rigid and scarcely changing in fruit; stamens connate at base into a scarious ring; fruit circumscissile.

Genus 398. **HABLITZIA*** M. B.

M. B. in Mém. Soc. Nat. Mosc. V (1817) 24.

Flowers perfect, with some intermixture of pistillate ones, solitary, pedicellate, with 1 or 2 bracteoles, in a compound panicle; perianth greenish, with 5 spreading segments persistent in fruit, connate only at base; stamens 5, with small oval anthers, without appendages, the filaments shorter than perianth and united at base into a ring; stigmas 2 or 3, short, subulate, on a short style; fruit lenticular, circumscissile; seeds horizontal, with annular embryo, albuminous. Perennial scandent plants with alternate leaves. A monotypic genus.

1. *H. tamnoides* M. B. in Mém. Soc. Nat. Mosc. V (1817) 24; Fenzl in Ldb. Fl. Ross., III, 854; Boiss. Fl. Or. V, 987; Shmal'g., Fl. II, 365. – Ic.: Eichw. Pl. casp.-cauc. (1831–33) t. 23; Ulbrich in Engl. u. Prantl, Pflanzenf. 2 Aufl., 16 c, f. 174, I–K.

33 Climbing perennial to 100–200 cm tall, with a stout fleshy root; stems angled-sulcate, glabrous or sparingly hairy, branched; leaves long-petioled, ovate to oblong-ovate, entire, deeply cordate, taper-pointed, the upper ones often ovate-lanceolate, all glabrate or more often with short fugacious hairs on the veins, thin, to 20 cm long and 10 cm broad; expanded flowers 5–8 mm in diameter; perianth segments oblong, obtuse, 3-nerved, stellately spreading, mostly ca. 3 mm long; fruit strongly flattened at the top; seeds round, lenticular, 1.2–1.5 mm in diameter, with a rather acute margin, black, very glossy, smooth, unsculptured. May–July (Plate II, Figure 13).

Shady woods, especially spruce-and-beech, shaded places among rocks and in ravines, and riverside thickets. – Caucasus: Cisc., Dag., W., S. and E. Transc. Gen. distr.: Arm.-Kurd. Described from Mount Mechenka near Konstantinogorsk. Type in Leningrad.

Economic importance. An ornamental garden plant used for pergolas, porches, etc.

Tribe 3. **BETEAE** Moq. in DC. Prodr. XIII, 2 (1849) 43, 49 (ex parte); Ulbrich in Engl. u. Prantl., Pflanzenfam. 2 Aufl., 16 c (1934) 457. – Flowers

* Named for K. L. Hablitz (1757–1821), companion of S. G. Gmelin in his travels in southern Russia and Iran.

with half-inferior ovary, united at base; fruiting perianth indurated or markedly rigid; stamens connate at base into a fleshy disk; fruit ag-gregates common; fruit circumscissile.

Genus 399. **BETA*** L.

L.Gen.pl.ed. 5 (1754) 103; Sp.pl.ed. 1 (1753) 222.

Flowers perfect, 5-merous, with very small bracteoles or ebracteolate; perianth mostly herbaceous or more rarely petaloid, the segments united and indurated at base; stamens 5, the filaments united below into a glandular disk; ovary with 2 or 3 or rarely 4 or 5 short stigmas; flowers rarely solitary, commonly in glomerules of 2 or 3, fused at base, the whole glomerule falling in maturity; fruits fleshy or rigid, the indurated perianth forming a subligneous envelope; Annual, biennial, or perennial plants with broad alternate leaves. Seeds horizontal, albuminous, with subannular embryo. The genus contains 13 species. Russian: svekla.

1. Perianth segments thickish, green, herbaceous 2.
- + Perianth segments membranaceous, petaloid 3.
2. Plants of seacoasts, mostly perennial, rarely annual, with mostly slender woody usually branched root; lower branches procumbent or ascending; glomerules 1- or 2-flowered . . . 1. *B. perennis* (L.) Freyn.
- 34 + Cultivated plants, sometimes weeds when naturalized, mostly with a thick succulent annual or biennial root; stem erect; glomerules 1-8-flowered 2. *B. vulgaris* L.
3. Flowers solitary; perianth segments erose-toothed at apex 3. *B. lomatogona* Fisch. et Mey.
- + Flowers in glomerules of 2 or 3, only occasionally solitary; perianth segments entire or nearly so 4.
4. Segments of fruiting perianth widely expanded; bracteal leaves broad, in middle and lower part of inflorescence surpassing the glomerules 3. *B. macrorrhiza* Stev.
- + Segments of fruiting perianth raised or if widely expanded then always rather strongly inflexed; bracteal leaves narrow, shorter than the glomerules (except the lowermost) 5. *B. trigyna* W. et K.

Section 1. **VULGARES** Transch. in Bull. of Appl. Bot. and Plant-Breed., XVII, 2 (1927) 208. — Perianth segments rather thick, herbaceous.

1. *B. perennis* (L.) Freyn in Verh. ZBG. Wien XXVII (1877) 414. — *B. vulgaris*, *perennis* L. Sp. pl. (1753) 222; Il'in in Fl. Yugo-Vost. IV, 132; Transhel' in Tr. po prikl. bot., gen. i sel. XVII, 209. — *B. maritima* L. Sp. pl. ed. 2 (1762) 332; Fenzl in Ldb. Fl. Ross. III, 691. — *B. vulgaris maritima* Moq. Chenop. (1840) 15; Shmal'g., Fl. II, 370. — Ic.: Fl. Yugo-Vost. IV, fig. 252; Transhel', ibid., figs. 7 and 8. — Exs.: Rchb. Fl. Germ. exs. no. 580.

Perennial, rarely annual, 50–120 cm high, glabrous or puberulous, green or reddish-veined; root woody; stems erect or ascending, sulcate, branched

* Name used by Pliny.

mostly numerous, commonly with decumbent or ascending branches; radical leaves long-petioled, mostly ovate, obtuse, often mucronate, cordate, more rarely rounded at base; cauline leaves short-petioled, ovate to lanceolate, acute or acuminate, all entire, the margin slightly undulate; inflorescence leafy; flowers in glomerules of 1 or 2; bracteal leaves shorter than to surpassing the glomerules; perianth pale green, its segments oblong, entire, scarious-margined, obtuse, keeled; segments of fruiting perianth inflexed and appressed to the fruit; stigmas 2 or rarely 3, oblong-oval or oval-lanceolate; seeds blackish-brown, lustrous, faintly reticulate. May—September.

- Seacoasts. — European part: Bl. (Molochnaya River ?); Caucasus: E. Transc.; Centr. Asia: Kara K. (Khodzha-kala-bami). — Gen. distr.:
 35 Atl. Eur., Med., Bal.-As. Min. Described from England and Belgium. Type in London.

2. *B. vulgaris* L. Sp. pl. (1753) 222 (p. p.); Sp. pl. (1762) 332. — Ic.: Rchb. Ic. Fl. Germ. XXIV, tab. 235, f. 1—5 et tab. 234, f. 1—7.

Annual or biennial, rarely perennial; roots stout, napiform or fusiform, ranging in color from white to purplish-violet, very rarely more slender than the stem; stem mostly erect, more or less branched or simple, commonly without elongated decumbent or ascending branches; leaves resembling those of the preceding species, but in cultivated varieties often larger and varying in color and shape; inflorescence leafy at least in lower part; glomerules containing 1—8 flowers; in other characters resembling the preceding species. (Plate II, Figure 2).

Cultivated plants, sometimes naturalized; occasionally occurring, especially in Transcaucasia, as a weed or ruderal plant. Described from European cultivated specimens.

Note. The cultivated beet is usually referred to the same species as wild beet, under the common name *B. vulgaris* L. It would, however, be preferable to separate cultivated beets from the wild as a distinct species. They differ from the wild-growing annual or biennial plants in having a more fleshy and nearly always straight root, a sturdy stem, and a leafy inflorescence. The name *B. vulgaris* L. must be retained for the cultivated beet which is most directly descendant from *B. perennis* (L.) Freyn. The cultivated form originates from the E. Mediterranean. In Asia Minor a considerable polymorphism of this crop can still be observed at the present time, with a considerable proportion of culturally backward varieties that have by now largely disappeared in Europe (e. g., orange-colored). When grown under northern conditions, these varieties produce a high percentage of bolters. A similar phenomenon may be observed to some extent in Transcaucasia. Cultivated beet consists of two races: *B. vulgaris* subsp. *esculenta* (Salisb.) Gürke in Richter-Gürke Pl. Europ. II (1897) 127 (= *B. esculenta* Salisb. Prodr. (1796) 152; *B. sativa* Bernh. Syst. Verz. Erf. (1800) 162; *B. rapa* Dumort. Fl. Belg. (1827) 21) — a vegetable cultivated for its root. The same race includes also the sugar beet, var. *altissima* Rössig. Bot. Best. d. Runkelrüben, 1800 (= *B. vulgaris saccharifera* Alef. Landw. Fl. (1866) 281). Leafy beets or mangels belong to another race, *B. vulgaris* subsp. *cicla* (L.) Moq. in DC. Prodr. XIII, 2 (1849) 56 (= *B. vulgaris*,

36 *cicla* L. Sp. pl. ed. I, 1753, 222; *B. hortensis* Mill. Gard. Dict. ed. 8, 1768, no. 2; *B. cicla* Pers. Syn. I, 1806, 295; *B. sulcata* Gasp. in Guss. Sic. Syn. II, 1834, 800). Upon naturalization, cultivated beet may degenerate and produce a slender root. Such specimens occur sometimes in ruderal and weed-infested sites and they are referred to a separate race, *B. vulgaris* subsp. *foliosa* (Ehrenb.) Asch. et Schweinf. Ill. Fl. d'Egypte (1887) 125 (= *B. foliosa* Ehrenb. Ind. Sem. Hort. Berol. 1826; *B. stricta* C. Koch. in Linnaea XXII, 1849, 180). It would not be very incorrect to consider these two cultivated beets as separate species, *B. esculenta* Salisb. and *B. cicla* Pers.

Economic importance. Beet is of outstanding economic importance both as sugar beet (*B. vulgaris* subsp. *esculenta* var. *altissima* Rössig), a relatively quite recent crop (end of the 18th century), and as garden beet, which was already grown some 2,000 years B. C. The latter is known as a root vegetable and is widely distributed as a horticultural crop (*B. vulgaris* subsp. *esculenta* (Salisb.) Gürke). It is represented by many varieties which differ in root color (white — var. *alba* DC., yellow — var. *lutea* DC., pink or reddish — var. *rosea* (L.) Moq.), dark red in a common cultivated form — var. *rubra* (L.) Moq.), as well as a leaf vegetable (*B. vulgaris* subsp. *cicla* (L.) Moq.) that is eaten like spinach and also serves as a forage and ornamental plant. This beet also has many varieties distinguishable by the color of their roots (white — var. *sulcata* (Gasp.) Moq., sometimes with crisped leaves — var. *crispa* (Tratt.) Moq.; yellow — var. *flaves cens* DC.; red to purple — var. *purpurascens* Moq.; dark red — var. *incarnata* Moq.). Root analyses of sugar beet have shown (Schneider in Wiesner) 95—96% of soluble as against 4—5% insoluble components. The latter consist of protoplasm and cellulose residues, certain intercellular substances, insoluble protein and fat compounds, and ash constituting 0.4—1.4%. The most important soluble substances are sugars, notably saccharose which fluctuates between 13 and 22%. There are also smaller amounts of invertase, raffinose, pectins, fructose, glucose, arabinose, galactose, xylan, dextran, levulan, saccharin, and coniferin. It has also been established that the sap contains organic acids, such as glycolic, quinic, oxalic, succinic, citric, malic, aconitic, glutaric, adipic, tartaric, and some others (Schmidt and Rumpler, according to Ulbrich). The presence of saponin accounts for frothiness of the sap. Among reported aromatic compounds are coniferin, vanilin, and burnt catechin (Brandkatechin). The latter, acting in combination with tyrosine and ferric salts, is thought by Gonneman to be responsible for the formation of the beet pigment. According to Reinecke, the pigment is related to red alkannin.

39 Amides detected in beet include leusine, asparagine, aspartic acid, glutamine, glutamic acid, and tyrosine. Organic bases include lecithin and betaine or trimethyl-glycocoll ($C_6H_{11}NO_2 \cdot H_2O$) which is the predominant base in beet. Other substances recorded are xanthine, guanidine, vernine, hypoxanthine, adenine, carnine, arginine, allantoin, and various vicinals. Enzymes known to be present include invertase, diastase, tyrosinase, catalase, and zymase (according to Ulbrich). Beet juice is sometimes used to color wine and as an ingredient of vitamin extracts.

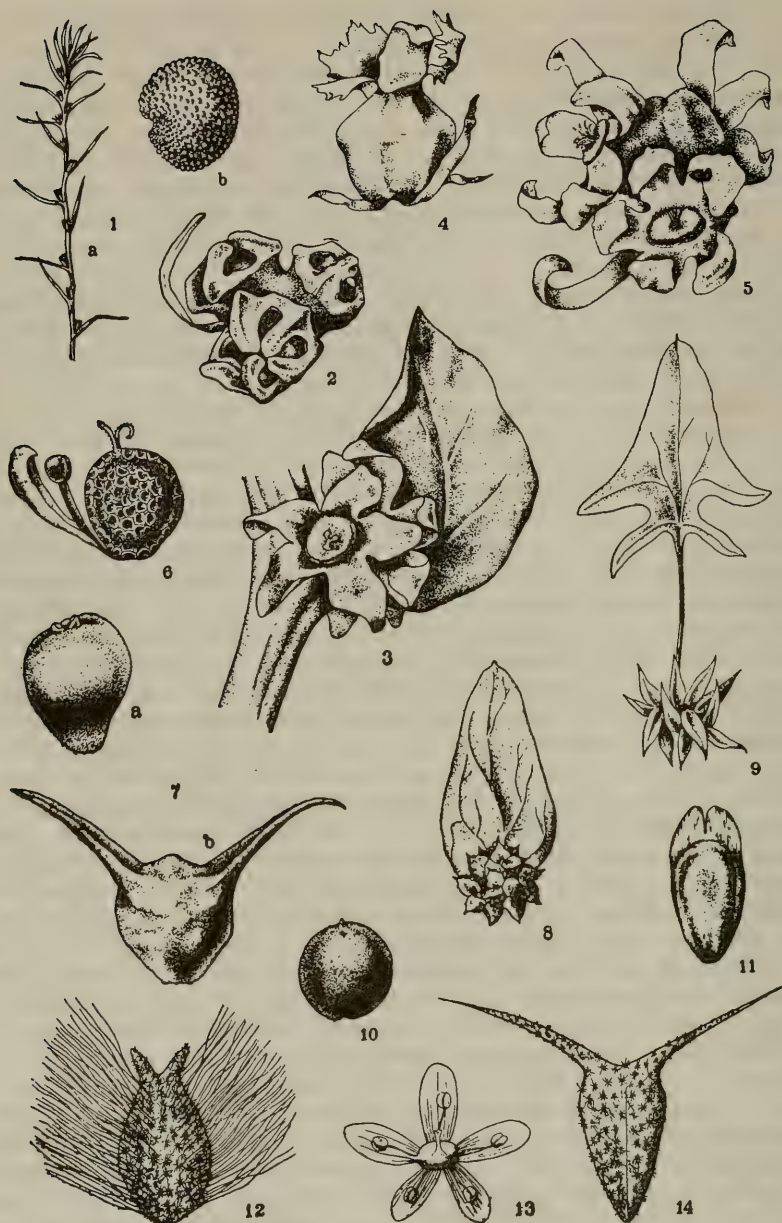


PLATE II. 1. *Polycnemum heuffelii* Lang: a) branch, b) seed.— 2. *Beta vulgaris* L.— 3. *B. macrorrhiza* Stev.— 4. *B. lomatogona* F. et M.— 5. *B. trigyna* W. et K.— 6. *Monolepis asiatica* Fisch. et Mey.: flower.— 7. *Spinacia oleracea* L.: fruits: a) var. *glabra* Gürcke, b) *f. spinosa* Asch. et Gr.— 8. *S. tetrandra* Stev.— 9. *S. turkestanica* Iljin.— 10. *Axyris sphaerosperma* Fisch. et Mey.— 11. *A. amarantoides* L.— 12. *Eurotia ceratoides* (L.) C. A. M.: fruit.— 13. *Hablitzia tamnoides* M. B.: flower.— 14. *Ceratocarpus turkestanicus* Sav.-Rycz.

Section 2. COROLLINAE Transch., l. c., 215. — Perianth segments petaloid.

3. *B. macrorrhiza* Stev. in Mém. Soc. Nat. Mosc. III (1812) 257; Boiss. Fl. Or. IV, 900; Fenzl in Ldb. Fl. Ross. III, 691; Transhel' in Tr. po prikl. bot. i sel. XVII, 2 (1927) 215. — *B. foliosa* Hausskn. in Sched. ad P. Sint. It. or. (1890) no. 2750 (non Ehrenb.). — Ic.: Transhel', ibid., fig. 11. — Exs.: Sintenis, It. or. no. 2750.

Perennial, 40–60 cm high; root stout, fusiform, red within; stems several, often procumbent, deeply furrowed; cauline leaves ovate (radical leaves so far unknown), the lower ones rather large, slightly cordate at base, obtuse, petiolate; bracteal leaves ovate or subglobular, greatly surpassing the glomerules; inflorescence elongated, spikelike, leafless in upper part; flowers 3 in glomerule; perianth lobes large, flat in fruit, greenish on the back, with a white scarious entire margin, spreading; seeds large, oval, 3.5–4 mm long, blackish-brown, lustrous, reticulate-rugose, commonly irregularly flattened laterally. May–June. (Plate II, Figure 3).

Slopes. — Caucasus: Dag., E. Transc. (Kuba District). — Gen. distr.: Arm.-Kurd. (Egin). Described from Khinaluch in the Kuba District ["raion"] of the Baku District ["okrug"]. Type in Leningrad.

4. *B. lomatogona* Fisch. et Mey. in Hohen. Enum. pl. Talysch. in Bull. Soc. Nat. Mosc. no. 3 (1838) 360; Boiss. Fl. Or. IV, 899; Fenzl in Ldb. Fl. Ross. III, 690; Transhel' in Tr. po prikl. bot. i sel. XVII, 2 (1927) 217. — *B. longespicata* Moq. Chenop. (1840) 3. — Ic. — Transhel', ibid., fig. 12.

Perennial, 40–50 cm high, glabrous, with a long woody root; stems mostly several, erect, sulcate, scantily branched; lower leaves long-petioled, ovate-lanceolate, subobtuse; the upper oblong-lanceolate to linear, acute; bracteal shorter than fruits; inflorescences elongated, subspiciform, leafless almost right down; flowers solitary, not united into glomerules; perianth segments oblong, with a broad white scarious erose-dentate margin, erect in fruit; fruit 5-sided, with flat faces and submembranaceous angles; seeds blackish-brown, strongly rugose. May–June. (Plate II, Figure 4).

Sunny slopes. — Caucasus: Tal. Gen. distr.: Asia Minor. Described from Tatuna in Talysh. Type in Leningrad.

Economic importance. The sugar content sometimes attains 25–30% (Sheiba).

5. *B. trigyna* W. et K. Descr. et ic. pl. rar. Hung. I (1802) 34; Fenzl in Ldb. Fl. Ross. III, 691; Shmal'g., Fl. II, 370; Transhel' in Tr. po prikl. bot. i sel. XVII, 2 (1927) 218; Il'in in Fl. Yugo-Vost. IV, 133. — Ic.: Waldst. et Kit., l. c., t. 35; Rchb. Ic. Fl. Germ. XXIV, t. 232; Transhel', ibid., fig. 14. — Exs.: Rchb. Fl. Germ. no. 580.

Perennial, 50–100 cm high, with a strong root and sparingly hairy young parts; stems solitary or several, erect, angle-furrowed, branched mainly in the inflorescence; lower leaves long-petioled, broad-ovate, slightly cordate, narrowed from the sinus into the petiole; middle short-petioled, deltoid or oval-ovate, often rounded at base; upper rhombic or broadly lanceolate, acuminate; all leaves entire and mostly sparsely

hairy; inflorescence pyramidal, almost leafless, branched; bracteal leaves linear, not surpassing the glomerules; flowers 1—3 in glomerule; perianth corolloid, lurid, very rarely white (var. *albiflora* Bordz.); perianth segments broad, obtuse, ecarinate, with scarcely irregularly crenulate margin, in fruit becoming oblong, ascending or spreading, cucullate and slightly keeled; stigmas 3, oblong-subulate; seeds black, lustrous, distinctly sculptured. May—July. (Plate II, Figure 5).

Seacoasts, grassy slopes, and ruderal places. — European part: Bl., Crim.; Caucasus: S., W., and E. Transc. Gen. distr.: Centr. Eur., Bal.-As. Min. Described from Hungary, from the vicinity of the Nova Pazova Department in the Syrmienk region. Type in Vienna.

Tribe 4. CHENOPODIEAE C. A. M. in Ldb. Fl. Alt. I (1829) 371. — Annual, more rarely perennial or frutescent plants; perianth mostly of 5 segments not changing in fruit (except the genus *Cycloloma* from North America); stamens 1—5, free at base or united into a glandular disk; flowers bractless, perfect as a rule but often unisexual flowers occurring on the same plant as a result of abortion of stamens or carpels; seeds either horizontal or vertical.

41 Genus 400. **CHENOPODIUM***L.
L. Gen. pl. ed. 5 (1754) 103; Sp. pl. 1 (1753) 218.

Flowers perfect, more rarely intermixed with pistillate, glomerulate, in spiciform or paniculate inflorescences, ebracteolate; perianth mostly of 5, rarely 3 or 4 segments, green, not changing in fruit; stamens 5, rarely fewer, the filaments free or more rarely united into a fleshy disk; anthers unappendaged; stigmas 2, very rarely 3—5, filiform, the style mostly short; fruit with a thin scarious readily detachable pericarp, commonly horizontal, but sometimes intermixed with vertical or only vertical; seeds with a hard brittle lustrous coat, the embryo annular or hippocrepiform. Plants annual, biennial more rarely perennial or shrubby, with rare exceptions glabrous, often farinose; leaves alternate, petiolate, the flat blade often incised-toothed.

The genus contains about 250 species. Russian: мар'.

1. Plants with jointed or glandular hairs, very rarely quite glabrous (*C. aristatum* L.) and then inflorescence branches aristate-tipped, mostly pleasantly scented 2.
- + Plants glabrous or farinaceous by bladdery hairs, inodorous or fetid (with a smell of rotten herrings) 6.
2. Flowers in regularly disposed glomerules; inflorescence mostly paniculate (Section 1. *Ambrina* Benth. et Spach) 3.
- + Flowers disposed in lower more or less regular dichasia (Section 2. *Botryoides* C. A. M.) 4.
3. Leaves oblong, with remote obtuse teeth, on branches and in inflorescence much narrower and entire, the plant thus apparently heterophyllous; inflorescence leafy throughout; annuals
. *C. ambrosioides* L.

* From the Greek *chen*, a goose, and *podion*, foot.

- + Leaves rhombically oblong-ovate, dentate; inflorescence compact, leafless (bracts very small); perennials 1. *C. ambrosioides* var. *suffruticosa* (Willd.) Aellen.
4. Glabrous plants (Subsection *Teloxis* Aellen et Iljin) 4. *C. aristatum* L.
- + Glandular-hairy plants (Subsection *Botrys* Aellen et Iljin) 5.
5. Bracteal leaves entire; perianth segments covered with glandular hairs, ecarinate; seeds with an interrupted groove or an annular ridge or both on the circumference 2. *C. botrys* L.
- + Bracteal leaves lobate; perianth segments covered only with sessile glands, the keel tuberculate; seed obtusish on the circumference 3. *C. foetidum* Schrad.
6. Segments of mature fruiting perianth fleshy, baccate, red (Section 3. *Eublittum* Aellen) 7.
- + Perianth always herbaceous or membranaceous, green 9.
7. All glomerules in the axils of bracteal leaves 8.
- + Upper glomerules not distinctly bracteate, grouped in spikelike inflorescences 7. *C. capitatum* (L.) Asch.
8. Leaves thin, entire, the blade nearly as broad as long; seeds distinctly oval. Pamir-Alai 6. *C. korshinskyi* Litw.
- + Leaves comparatively thickish, repand-dentate, more elongated; seeds round or rounded-oval 5. *C. foliosum* (Moench) Asch.
9. Perianth segments rather succulent, connate (at least in lateral flowers of the glomerule); perianth of 3 segments (Section 4. *Degenia* Aellen) 8. *C. chenopodioides* (L.) Aellen.
- + Perianth segments of all flowers distinct 10.
10. All seeds vertical; perennial plants with triangular-hastate leaves (Section 5. *Agatophyton* Benth. et Hook.) 9. *C. bonus henricus* L.
- + All seeds horizontal or both vertical and horizontal seeds present 11.
11. Terminal flowers in glomerules with perianth of 4 or 5 segments and horizontal seeds; lateral flowers with perianth of (2-3)3(-4) segments and vertical seeds (Section 6. *Pseudoblittum* Aellen) 12.
- + Perianth of all flowers 5-merous; seeds horizontal (more rarely, in very compact glomerules, the number of segments is reduced and the seed is obliquely oriented) (Section 7. *Chenopodia* C. A. M.) 13.
12. Leaves white-farinose with yellow vein beneath, green and often somewhat lustrous above 10. *C. glaucum* L.
- + Leaves glabrous and green on both sides 11. *C. rubrum* L.
13. Undershrubs 18. *C. frutescens* C. A. M.
- + Annual plants 14.
14. Leaves short-acuminate, entire, the margin pellucid 15.
- + Leaf margin not pellucid 16.
15. Leaves ovate or rounded-ovate. Kazakhstan and S. Siberia 15. *C. acuminatum* Willd.
- + Leaves lanceolate to linear-lanceolate. Far East 16. *C. vachelii* Hook. et Arn.

- 43 16. Seeds yellowish-white; cultivated and naturalized plants 30. **C. quinoa* Willd.
+ Seeds black or brown; plants not in cultivation 17.
17. Surface of testa (strong magnification !)* more or less distinctly
honeycomb-pitted, the pits hexagonal or rarely almost round . . . 18.
+ Surface of testa smooth or with sculpturing of pattern other than
honeycomb 25.
18. Seeds large, 1.5–2 mm in diameter; leaves more or less cordate at
base, coarsely sinuate-dentate 14. *C. hybridum* L.
+ Seeds smaller; leaves more or less narrowed at base 19.
19. Honeycomb pits deep, sharp-edged, more or less regularly outlined
. 20.
+ Honeycomb pits rather irregular and indistinct, with sometimes
hardly thickened edges 22.
20. Honeycomb pits closely adjacent, not separated by radial grooves
(though these have been observed in East Asian specimens of
C. serotinum L., possibly hybrids) 21.
+ Radial grooves passing between the pits . . 30. **C. hircinum* Schrad.
21. Leaves markedly longer than broad, 3-lobed, the elongated middle lobe
with more or less parallel margins, the lateral lobes inserted low down
. 30. *C. serotinum* L.
+ Leaves oval to broad-elliptic, more weakly 3-lobed, the middle lobed
broadly rounded in apical part and faintly point-tipped, the lateral
lobes inserted at about the middle 29. **C. berlandieri* Moq.
22. Leaves oval, not clearly 3-lobed, more rarely broadly lanceolate
and then entire; lateral lobes formed by 1 or 2 obtuse teeth and
situated more or less at the middle of the leaf; prostrate plants . . .
. 18. *C. prostratum* Bge.
+ Leaves deltoid, rather clearly 3-lobed; lateral lobes situated mostly
in the lower part of the leaf blade 23.
23. Perianth segments not appressed to the fruit 27. *C. jenssejense* Aellen et Iljin.
+ Perianth segments more or less appressed to the fruit 24.
24. Plants mostly yellowish-green; leaves in typical specimens with
sharply tapering 1- or 2-parted lateral lobes, the narrow middle lobe
with more or less parallel margins or regularly acuminate and
remotely and irregularly toothed with slightly pointed teeth
. 29. *C. klinggraeffii* (Abromeit) Aellen.
+ The lateral lobes of leaves in typical specimens broad, mostly with
2 principal and 2 or 3 subsidiary teeth; middle lobe mostly acuminate,
regularly and closely sharp-toothed 26. *C. viride* L.
- 44 25. Plants with the odor of rotten herrings; leaves broadly ovate-deltoid
. 25. *C. vulvaria* L.
+ Plants not malodorous; leaves triangular-deltoid or elliptic to
linear 26.
26. Seeds dull, smooth, with a fine regular minutely flat-granular pattern;
plants mostly glaucescent. Southern extremity of the European part
of the USSR, of the Caucasus, and of Soviet Central Asia
. 13. *C. murale* L.

* In identification of critical species of this genus, the sculpturing of the testa plays a decisive role, being a consistent character for the various species. The use of magnification, such as provided by a microscope, is necessary.

- + Seeds lustrous, with different sculpturing (not granular) 27.
- 27. Plants never farinose; leaves ovate to suboblong, all strictly entire; inflorescences loose; fruiting perianth open . . . 12. *C. polyspermum* L.
- + Leaves mostly toothed, at least partly, or with some teeth or auricles only at base and sometimes only in lower leaves; plants different from the preceding 28.
- 28. Perianth glabrous or with scattered short yellowish globular bladder-shaped hairs 17. *C. urbicum* L.
- + Perianth conspicuously and heavily farinose; bladderlike hairs large and white 29.
- 29. Middle cauline leaves as long as broad, more or less distinctly 3-lobed 30.
- + Middle leaves longer than broad 31.
- 30. Middle lobe of leaves with more or less parallel margins, broad and gradually truncate at apex 20. *C. opulifolium* Schrad.
- + Middle lobe gradually acuminate 24. *C. bryoniaefolium* Bge.
- 31. Leaves elliptic-ovate, sparingly toothed 32.
- + Larger leaves deltoid or ovate to lanceolate, lobed-toothed or entire 33.
- 32. Leaves with more or less parallel margins, mostly oblong-elliptic, entire or toothed and with one larger tooth in the lower part of the leaf 21. *C. strictum* Roth.
- + Leaves rounded, oval-deltoid, entire or with one more or less prominent tooth in the middle part of the margin 23. *C. sosnowskyi* Kapeller.
- 33. Leaves with a midvein and a pair of lateral veins arising at base. **C. pratericola* Rydb.
- + Leaves with a midvein and several lateral veins arising above the base 34.
- 34. Large plants with large leaves 22. *C. giganteum* Don.
- + Plants of moderate size; leaves not large 19. *C. album* L.

Section 1. AMBRINA Benth. et Hook. Gen. pl. III (1880) 51; Spach, Hist. nat. V (1836) 295 (as genus). — Plants mostly aromatic, with glandular jointed hairs and glands; flowers in regularly disposed glomerules; perianth normally with 5 segments more or less united to the middle; seeds mostly horizontal; embryo horseshoe-shaped.

1. *C. ambrosioides* L. Sp. pl. (1753) 219; Fenzl in Ldb. Fl. Ross. III, 704; Shmal'g., Fl. II, 366. — *Ambrina ambrosioides* Spach, Hist. nat. veg. V (1836) 297. — *Atriplex ambrosioides* Crantz. Inst. 1 (1766) 207. — *Blitum ambrosioides* Beck. in Rchb. Ic. Fl. Germ. XXIV (1909) 118. — Ic.: Rchb., l. c., t. 251, f. 1–10. — Exs.: Fl. exs. Austro-Hung. no. 3846.

Annual to perennial, 30–80 cm high, aromatic, branched glabrous or with scattered hairs in upper part; leaves alternate, oval-elliptic to oblong, tapering at both ends, remotely and obliquely obtuse-toothed, covered on both surfaces with golden-yellow sessile glands, the middle ones 6–8 cm long and 2–3 cm broad, those on upper branches and on peduncles often reduced and entire, hence the plant apparently heterophyllous; inflorescences terminal panicles or only slender interrupted spikes, the subtending bracts several times the length of glomerules; flowers perfect and pistillate; perianth segments 4 or 5, glabrate or rarely glandular; ovary covered

at the top with stalked retrorsely curved glands; seeds round or rounded-oval, 0.5–0.7 mm in diameter, blackish-brown, smooth, lustrous, covered with thin easily detached lurid pericarp, either horizontal or vertical. June–September.

Weed-infested places, rare. — European part: V.-Don, Bl., M. Dnp. (banks of the Dnieper); Caucasus: Transc. Gen. distr.: Med., Bal.-As. Min., Afr., Aust., N. and S. Am. (native in tropical America). Described from Mexico. Type in London.

- 46 Note. A very polymorphous species. Only one race has so far been observed in Europe, namely subsp. *euambrosioides* Aellen (in Fedde Rep. Sp. nov. XXVI, 1929, 34), but this occurring in two varieties, the annual var. *typicum* (Spegazz.) Aellen (a more glabrous plant with leafy inflorescence) and perennial var. *suffruticosum* (Willd.) Aellen (more hairy, with almost leafless inflorescence). The second variety was usually reported erroneously by European botanists under the name *C. anthelminticum* L. which is a North American race of *C. ambrosioides* L. and has not so far been found in Europe.

Economic importance. Cultivated in various countries. The plant yields a colorless or faintly yellowish anthelmintic essential oil, with unpleasant scent. The yield of oil is highest at fruit ripening and then begins to diminish. The oil resides in the glandular hairs of leaves and perianth. The active principle of the oil is peroxide-ascaridole ($C_{10}H_{16}O_2$); its content fluctuates between 50 and 77% (highest at fruit ripening). Another ingredient of the oil is cymene, sometimes amounting to as much as 44%, the amount decreasing in this case with maturity. The yield of the essential oil from fruiting inflorescence attains up to 2.3% of air-dry weight; from vegetative parts rarely as much as 1%, especially from fresh shoots. According to Rutovskii, this oil is of value for the perfume industry. Far superior as regards oil yield is *C. anthelminticum* L. Its seeds and herbage also contain saponin.

Section 2. BOTRYOIDES C. A. M. in Ldb. Fl. Alt. I (1829) 410. — *Botrydium* Spach, Hist. nat. V (1836) 298 (as genus). — Plants covered with jointed glandular hairs, rarely glabrous; flowers in dichasia or monochasia; seeds horizontal; embryo horseshoe-shaped.

Subsection 1. BOTRYS Aellen et Iljin comb. nova; Koch. Syn. Fl. Germ. Helv. ed. 1 (1837), 607 (as section of the genus *Chenopodium*). — Branches of the dichasium not point-tipped; plants covered with glands and jointed hairs.

2. *C. botrys* L. Sp. pl. (1753) 219; Fenzl in Ldb. Fl. Ross. III, 704; Shmal'g., Fl. II, 366; Kryl., Fl. Zap. Sib. IV, 887; Il'in in Fl. Yugo-Vost. IV, 136. — *Ambrina botrys* Moq. Chenop. (1840) 37. — Ic.: Fl. Yugo-Vost. IV, fig. 253; Rchb. Ic. Fl. Germ. XXIV, t. 250, f. 1–9. — Exs.: Reipubl. Boh.-Slov. no. 118.

Annual, 15–60 cm high, yellowish-green, fragrant, glandular-hairy, branched; leaves alternate, petiolate, oblong, obtusely pinnatifid, with obtuse-toothed margin, the upper ones in the inflorescence more simple and

commonly entire; flowers in a pyramidal paniculate inflorescence, perfect, mostly 5-merous; perianth segments oblong, pointed, densely covered with glandular hairs; stamens 1—3; seeds horizontal, 0.5—0.75 mm in diameter, little compressed, with an interrupted groove or with an annular ridge or with both alternating on the circumference, blackish-brown, somewhat lustrous, covered by a caducous variegated pericarp, with scattered broad irregular whitish stripes and speckles. July—August. (Plate III, Figure 1).

Sandy soils, stony places, chalk, dry riverbeds, cultivated fields, and refuse dumps. — European part: U. Dnp. (S.), M. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., W., S. and E. Transc.; W. Siberia: U. Tob., Irt., Alt. (rare); Centr. Asia: throughout. Gen. distr.: Med., Afr., Bal.-As. Min., Arm.-Kurd., Iran., Ind.-Him., Tib., Mong., China. Described from S. Europe. Type in London.

Economic importance. Used as moth repellent. Applied in popular medicine for treatment of asthma, catarrhal or spasmodic condition, and migraine. It yields very small quantities of sweet-smelling volatile oil.

3. *C. foetidum* Schrad. Magaz. Ges. Naturf. Freunde Berl. (1808) 79; Fenzl in Ldb. Fl. Ross. III, 705; Shmal'g., Fl. II, 366. — *C. schradarianum* Schult. Syst. veg. VI (1820) 260. — *Ambrina foetida* Moq. Chenop. (1840) 38. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 251, f. 10.

Annual, 20—60 cm high, strongly fetid, covered with glandular hairs and glands, branched; leaves alternate, petiolate, oblong, obtusely pinnatifid, the uppermost in inflorescence reduced but also lobed; flowers in a pyramidal panicle; perianth segments covered with sessile glands, prominently keeled on the back, the keel strongly toothed or tuberculate; seeds horizontal, 0.5—1 mm in diameter, lenticular, with bluntish margin, slightly concave at the hilum, black, lustrous, glabrous, covered by a thin scarious minutely papillose pericarp. July—September.

Weed-infested places; cultivated and naturalized. — European part: U. Dnp. (S.), M. Dnp., Bl.; Caucasus: Dag., E. and S. Transc. Gen. distr.: tropics and subtropics; native in Africa. Described from European specimens.

Economic importance. Apparently of similar uses as the preceding species.

Subsection 2. *TELOXIS* Aellen et Iljin comb. nova. — *Teloxis* Moq. in Ann. sc. nat. sér. 2, 1 (1834) 289 (as genus). — Flowers in symmetrical dichasia; flowering branchlets mostly awn-tipped. Plants glabrous (USSR) or with sparse glands and jointed hairs.

4. *C. aristatum* L. sp. pl. (1753) 221; Kryl., Fl. Zap. Sib. IV, 888; Il'in in Fl. Yugo-Vost. IV, 137. — *Teloxis aristata* Moq. in Ann. Sc. nat. sér. 2, I, 40 (1814) 289; Fenzl in Ldb. Fl. Ross. III, 693; Turcz. Fl. baic.-dah. II, 1 (1856) 16. — *Lecanocarpus aristatus* Zucc. in Mart. Hort. Monac. (1829) 56. — Ic.: Gmel. Fl. Sib. III, t. 15, f. 1; Fl. Yugo-Vost. IV, fig. 254. — Exs.: HFR no. 481.

Annual, 5—30 cm high, green, subsequently reddening, strongly branched from base, covered especially below with very short hairs; branches

spreading; leaves alternate, lanceolate to linear, obtuse, gradually narrowed toward base, entire; flowers in crotches of the upper leafless part of the stem and of the branches, these prickle-pointed or rarely none (var. *virginicum* (L.) Aellen et Kloss.); flowers sessile; in lower part of the inflorescence perfect, in upper part pistillate; perianth glabrous, with obtuse segments; seeds horizontal, round, 0.4–0.6 mm in diameter, depressed at the top, very narrowly rimmed, blackish-brown. July–September. (Plate III, Figure 2).

Outcrops, stony and sandy steppe soils, as weed in cultivated and old fields, and ruderal. — European part: L. Don (Belovodsk area), V.-Kama (E.), Transv. (E.); W. Siberia: Ob (S.), U. Tob., Irt., Alt.; E. Siberia: Yenisei (S.), Ang.-Say., Dau., Lena-Kol. (S.); Far East: Ze.-Bu., Uss.; Centr. Asia: Balkh. (N.). Gen. distr.: Dzu.-Kash., Mong., Jap.-Ch., N. Am. Described from Siberia. Type in London (?).

Economic importance. A common field weed in Siberia.

Section 3. *EUBLITUM* Aellen in Verh. Naturforsch. Ges. Basel XLI (1930) 103. — *Blitum* L. Sp. pl. (1753), 4 (gen.). — *Monocarpus* Adans. Fam. II (1763) 261 (gen.). — Plants glabrous or covered with bladdery hairs; perianth with 3 (–5) distinct segments, berrylike in fruit; seed vertical; embryo horseshoe-shaped.

5. *C. foliosum* (Moench) Aschers. Prodr. Fl. Brandenb. I (1864) 572; Shmal'g., Fl. II, 369; Il'in in Fl. Yugo-Vost. IV, 147. — *C. virgatum* (L.) Jessen (non Thunberg) Deutsch. exc. fl. (1879) 300; Kryl., Fl. Zap. Sib. IV, 889. — *C. Blitum* F. Müll. Sel. Pl. Ind. cult. (1876) 49. — *Blitum virgatum* L. Sp. pl. (1753) 4; Fenzl in Ldb. Fl. Ross. III, 706. — *Mono-carpus foliosus* Moench, Meth. (1794) 342. — Ic. — Engl. u. Prantl, Pflanzenf. III, 1a, f. R-U; Syreishch., Ill. Fl. Mosk. g. II, 87. — Exs.: Fl. polon. exs. no. 987 (sub *Blito*). Vernacular: zhmind.

Annual, 15–80 cm high, glabrous; stem branched, rarely simple, leafy to the top; leaves alternate, green on both sides; radical and lower cauline leaves long-petioled, sinuate-dentate, hastate or ovate to triangular-ovate, sometimes broadly triangular (f. *latifolium* Fenzl, l. c.), acute, broadly cuneate from obliquely notched base, the lower teeth often retrorse; middle leaves with shorter petioles, oblong-ovate, the lower teeth often spreading; upper leaves in the inflorescence narrower, with antrorse lower teeth or sometimes entire; very rarely leaves broadly hastate-triangular and entire (var. *hastatum* Fenzl, l. c. = *Blitum petiolare* Link, Enum. Hort. Berol. I, 1821, 8 = *B. tataricum* Bess. Cat. H. Kremenec., 1816, 23). — Flowers in compact glomerules borne in the axils of leafy inflorescence, perfect, mostly 3-merous; fruiting perianth fleshy, reddening, berrylike; stamen 1; seed vertical, globular or globular-pyriform, 1–1.25 mm long, smooth, blackish-brown, scarcely lustrous, slightly compressed, the circumference rimmed by a broad band with a shallow longitudinal groove. July–August. (Plate III, Figure 3).

Stony slopes, limestone and chalk, also ruderal places. — European part: throughout except Kar.-Lap. and Dv.-Pech.; Caucasus: throughout; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia:

throughout. Gen. distr.: throughout W. Eur., As.-Min., Arm.-Kurd., Iran., Ind.-Him., Tib., Mong., Dzu.-Kash. Described from Europe. Type in London.

Economic importance. Used in some places as a foliage vegetable. The succulent glomerules, which have a cloying sweet taste, are sometimes used as a dainty; they contain a red pigment which may be used to improve the color of wine. The seeds contain saponin.

6. *C. korshinskyi* Litw. in Trav. Mus. Bot. VII (1910) 77. — *Blitum korshinskyi* Litw., l. c., 76.

Annual, 5 — 20 cm high, glabrous, green; with ascending stem and slender low branches; leaves alternate, thin, often somewhat transparent, triangular-hastate, mostly obtusish, entire or with occasional obtuse teeth, broadly cuneate at base, nearly as broad as long, gradually decreasing in size up the stem, the lower ones with very long petioles; flowers perfect with an intermixture of pistillate ones, in axillary glomerules of 1 — 15; glomerules to 3 mm in diameter, adnate to petiole near its base, borne nearly from the base of the stem; perianth 4- or rarely 5-merous; stamens 1 or 2; seeds vertical, ovaloid, ca. 1 mm long and 0.75 mm broad, strongly exserted, plumpish especially in upper part, slightly depressed transversely or somewhat slantingly, the groove around the circumference disappearing only near the radicle and here transformed into a rib, blackish-brown, obscurely tuberculate-dotted, scarcely lustrous, with a thin scarious pericarp. May — June.

Rocks. — Centr. Asia: Pam.-Al. (Darvaz). Endemic. Described from Tadzhikistan, from a locality between Dashtak and Kergovat. Type in Leningrad.

Note. So far known only from one location. This species has not yet been sufficiently explored and it may be merely a shaded rupestrian form of the preceding species.

50 7. *C. capitatum* (L.) Aschers. Fl. Prov. Brandb. I (1864) 572. — *Blitum capitatum* L. Sp. pl. (1753) 4; Fenzl in Ldb. Fl. Ross. III, 707; Turcz. Fl. baic.-dah. II, 2, 21. — *B. tataricum* Mill. Gard. Dict. ed. 8 (1768) no. 3. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 254, f. 1 — 8.

Annual, 15 — 60 cm high, glabrous, mostly branched; leaves alternate, especially the lower ones long-petioled, triangular, subhastate at base, entire or with occasional large teeth or sometimes repand-dentate, acute, more densely approximate below, disappearing in the inflorescence; glomerules rather large, disposed in a compact leafless spikelike inflorescence, only in more distant and bracteate lower part of inflorescence; perianth 3-merous, in central flowers 4- or 5-merous, reddening in fruit and becoming juicy and berrylike; stamen 1; seeds vertical, ovaloid or globular, mostly ca. 1 mm in diameter (0.75 — 1.25 mm), with convex faces, on the more convex side with a sharp narrow ridge-shaped margin, blackish-brown, somewhat lustrous, almost smooth, covered by a smooth scarious pericarp. July-August.

Cultivated and naturalized, occurring sporadically. Reported for European part: M. Dnp., U. V., L. Don; E. Siberia: Ang.-Say. (Irkutsk). Gen. distr.: throughout W. Europe except the North, but sporadically. Described from the Tyrol region in W. Europe. Type in London.

Economic importance. Used like spinach, but of rather poor quality. Also grown for ornament. The seeds contain saponin. The fruits yield a dye used to impart red color to wine and as rouge.

Section 4. DEGENIA Aellen in Magyar Bot. Lapok XXV (1926—1927) 56; Verh. nat.forsch. Ges. Basel, XLI (1930) 100. — Plants covered with bladdery hairs (farinaceous); perianth of terminal flowers in the glomerule 3—5-parted, the segments distinct almost down to base; seeds horizontal; perianth of lateral flowers 3-lobed, the segments united almost to the summit, the seeds vertical; embryo annular.

8. *C. chenopodioides* (L.) Aellen in Ostenia (1933) 98. — *Blitum chenopodioides* α L. Mant. II (1771) 170. — *Chenopodium polymorphum* β *chenopodioides* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 708. — *C. crassifolium* Hornem. Hort. Hafn. (1813) 254; Aellen in Mag. Bot. Lap. XXV (1926) 55. — *C. botryoides* Smith, Engl. Bot. XXXII (1811) t. 2247; Kerner in Osterr. Bot. Zeitschr. XXV (1875) 219. — *C. rubrum* var. *botryoides* Asch. et Gr. Syn. V (1913) 98 (non Sonder), p. p.; Il'in in Fl. Yugo-Vost. IV, 146 (pp.). — *Blitum polymorphum* C. A. M. in Ldb. Fl. Alt. I (1829) 13 (pp.); Fenzl in Ldb. Fl. Ross. III, 2 (1851) 707 (pp.); Kryl., Fl. Zap. Sib. IV, 890 (pp.). — *B. polymorphum* β *crassifolium* Chenop. (1840) 45 (pp.). — *B. rubrum* ζ *crassifolium* Moq. in DC. Prodr. XIII, 2 (1849) 84 (pp.). — *Chenopodium astrachanicum* Ldb. Cat. Hort. Dorp. (1829). — *Oxybasis minutiflora* Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 739.

Annual, to 50 cm high, with an erect or ascending stem, glabrous, except for young leaves farinose beneath; leaves broadly triangular-deltoid, to 9 cm long and 7 cm broad, mostly sharply sinuate-dentate, often with larger lowest tooth, or subentire, acuminate or obtuse, mostly broad at base and long-tapering toward the petiole, fleshy; glomerules either in a strongly branched terminal almost leafless pyramidal panicle or in sparingly flowered axillary inflorescences; perianth segments of lateral flowers connate, succulent, completely enclosing the fruit and then coriaceous, finely striated longitudinally, with a green winged keel, scarcely narrowed toward the summit, rather strongly toothed; terminal flowers in the glomerules regularly 5-parted, the seed horizontal (in lateral flowers vertical), the segments distinct down to base; fruit with a thin easily detachable lurid pericarp; seeds small, 0.3—0.5(—1) mm in diameter, the reddish-brown coarsely punctate testa with scattered impressed flexuous lines or rather indistinctly reticulate. July—September.

Wet solonchaks. — European part: Bl., Crim., L. Don, L. V., Transv.; Caucasus: Cisc.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Ar.-Casp., Balkh., Syr D. Gen. distr.: S. part of Atl. Eur., Med., Centr. Eur., Bal.-As. Min., Dzu.-Kash., Mong. (?), N. Am., S. Afr. Described from "Tartaria." Type in London.

Note. A variable plant. One of the varieties has a sturdy erect stem and rather large triangular sinuate-toothed leaves with lobelike basal tooth, and 40—60-flowered glomerules disposed in terminal inflorescences

(var. *lengyelianum* Aellen). Another variety is characterized by weak procumbent stems and ascending branches, rounded-lobed entire radical leaves, the broadly rounded-triangular or lance-deltoid stem leaves with an obtuse basal lateral tooth and a few small and indistinct upper teeth, and the 10—20-flowered glomerules in axillary inflorescences or, in addition, obscurely terminal ones (var. *degenianum* Aellen). The axillary inflorescences are often capitate (f. *glomeratum* Aellen = *C. rubrum* var. *glomeratum* Wallr. Sched. crit. (1822) 507). This species has been repeatedly confounded with *C. rubrum* L. and its distribution has not so far been satisfactorily established, probably being more extensive than indicated above.

Section 5. AGATOPHYTON (Moq.) Benth. et Hook. Gen. pl. III (1880) 52; Agatophyton Moq. in Ann. Sc. nat. 2 sér. I (1834) 191 (gen.). — Anserina Dumort. Fl. Belg. (1827) 21 (gen.). — Plants glabrous or farinaceous; seed vertical, longer than perianth, reniform; stigmas long; embryo horseshoe-shaped.

52

9. *C. bonus henricus** L. Sp. pl. (1753) 218; Shmal'g., Fl. II 369. — *Blitum bonus henricus* C. A. M. in Ldb. Fl. alt. I (1829) 11; Fenzl in Ldb. Fl. Ross. III, 708. — *Agatophytum bonus henricus* Moq. in Ann. Sc. nat. 2 sér., II, 1 (1834) 291. — Ic.: Syreishch., Ill. Fl. Mosk. g. II, 88; Rchb. Ic. Fl. Germ. XXIV, t. 257, f. 1—5 (sub *Blito*). — Exs.: P. Schultz. Fl. Germ. 18 IX 1900.

Perennial, 15—60 cm high, somewhat viscid and slightly farinaceous; stems numerous, mostly unbranched; leaves alternate, long-petioled, triangular-hastate to subsagittate, acute or acuminate, entire or slightly repand, somewhat lustrous, the uppermost ovate-lanceolate or even narrower; inflorescence a spikelike panicle, leafy in lower part; terminal flowers in glomerules, perfect, 5-merous; lateral ones 3- or 4-merous, with 2 or 3 stamens or more often pistillate; perianth segments obtuse, ecarinate, irregularly toothed at the summit; seeds always vertical, broadly reniform, 1.5—2 mm long, with obtuse margins, black, lustrous, smooth, obscurely striate longitudinally from 2 obtuse angles (magnifier!); pericarp thin, scarious. May—August.

Refuse dumps and gardens. — European part: Lad.-Ilm., U. V., V.-Kama (?), U. Dnp., M. Dnp. Gen. distr.: throughout Europe, N. Am. Described from W. Europe. Type in London.

Economic importance. Used in some places as wild spinach. The plant was widely cultivated in W. Europe during the Middle Ages before the introduction of garden spinach at the time of the Crusades. The young shoots are eaten like asparagus. An infusion of the foliage is applied in popular medicine against scab, and an infusion of the roots against chronic rash. The herbage contains saponin.

Section 6. PSEUDOBLITUM Aellen in Verh. naturforsch. Ges. Basel XLI (1930) 102, gen. — Differing from the section *Degenia* in the perianth segments of all flowers being distinct down to base.

* Named for Henry IV of Navarre (16th century).

10. *C. glaucum* L. Sp. pl. (1753) 220; Fenzl in Ldb. Fl. Ross. III, 700; Shmal'g., Fl. II, 368; Kryl., Fl. Zap. Sib. IV, 891; Il'in in Fl. Yugo-Vost. IV, 144. — *Blitum glaucum* Koch Syn. ed. 1 (1837) 608; Turcz. Fl. baic.-dah. II, 2, 22. — *Orthosporum glaucum* Peterm. Fl. Bienitz. (1841) 94. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 248, f. 1—9; Syreishch., Ill. Fl. Mosk. g. II, 86. — Exs.: Reliq. Mailleanae, no. 1628.

53 Annual, 5—75 cm high, glabrous; stem prostrate, ascending, or more rarely erect, mostly branched, glabrous; leaves alternate, petiolate, oblong, more rarely linear, ovate, or subovate, obtuse, cuneate at base, remotely coarsely and mostly obtusely sinuate-dentate, rarely subentire, farinose beneath, with a yellowish-green midvein, very rarely almost monochromatic (f. concolor Beck. Fl. Nieder-Oester. (1890) 331), green and glabrous above; flowers perfect, mostly 3-merous, the terminal in inflorescence 5-merous; perianth glabrous; stamens 1—5, mostly 3 or 4; seeds mostly horizontal, sometimes intermixed with vertical, subglobular, 0.5—0.75 mm in diameter, depressed from above, somewhat concave, at center or eccentrically, with narrow but rounded margin, blackish-brown, lustrous, rather inconspicuously reticulate in middle part and smooth on the periphery; pericarp smooth, scarious, caducous. July—September.

Solonchaks, riverbanks and lakeshores, gardens, and refuse dumps. — European part: throughout; Caucasus: everywhere except Tal. (?); W. Siberia: throughout from 60° N. lat.; E. Siberia: Yenisei (S.), Ang.-Say, Dau.; Far East: Ze.-Bu., Uss., Okh., Sakh., Kamch.; Centr. Asia: throughout, but rare in Kara K., Mtn. Turkm., Amu D., and Pam.-Al. Gen. distr.: throughout W. Eur., Iran., Ind.-Him., Tib., Mong., Manch., Korea, Greenland; related races occur in Africa, Australia, and North America. Described from W. Europe. Type in London.

Note. In places where *C. glaucum* L. and *C. rubrum* L. grow together, their hybrid, *C. schulzeanum* Murr. occurs. It is more like *C. rubrum* in aspect, but the farinose young leaves and the characteristic midvein place it close to *C. glaucum*.

Economic importance. A garden weed. The vegetative parts contain saponin. According to Larin, the plant is readily eaten by camels.

11. *C. rubrum* L. Sp. pl. (1753) 218; Shmal'g., Fl. II, 369 (pp.); Kryl., Fl. Zap. Sib. IV, 891 (pp.); Il'in in Fl. Yugo-Vost. IV, 890 (pp.). — *Blitum polymorphum* C. A. M. in Ldb. Fl. Alt. I (1829) 13 (pp.); Fenzl in Ldb. Fl. Ross. III, 707 (pp.). — Ic.: Syreishch., Ill. Fl. Mosk. g. II, 87. — Exs.: Pl. Finl. exs. No. 604; Fl. exs. Austro-Hung. No. 3848.

54 Annual, to 100 cm high, glabrous, soon reddening, with an erect main stem; lower branches prostrate, ascending at the tips; leaves mostly fleshy, to 11 cm long and 9 cm broad, ovate-deltoid, irregularly and deeply sinuate-lobed or toothed, with the lower teeth more prominent and lobelike, more rarely almost pinnately toothed or entire, cuneately narrowed at base to a long petiole, the upper ones mostly acuminate; flowers in axillary or terminal spikelike inflorescences, more rarely in broader loose inflorescences; terminal flowers in the glomerules often absent, at base with 4—5-parted perianths and keelless segments; lateral flowers of glomerules with 3-lobed perianths parted to base; fruiting perianth lurid, scarious, slightly enlarging; seeds subglobular or globular-ovoid, more or less compressed, 0.5—0.75 mm in diameter, rarely but 0.3 mm (f. microspermum Litv.), dark reddish-brown, closely puncticulate.

Solonetzes, refuse dumps, gardens, shores. — European part: throughout; Caucasus: Cisc., E. Transc.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Yenisei, Ang.-Say., Dau., Lena-Kol.; Centr. Asia: most probably throughout. Gen. distr.: throughout W. Europe, Asia Minor, Dzu.-Kash., Mong., Manch. (?), N. Am. Described from Europe. Type in London.

Note. Because of frequent confounding with *C. chenopodioides* (L.) Aellen, the distribution of this species has so far been very inadequately determined; it is clear, however, that in the steppe-desert zone it occurs only sporadically and is largely confined there to river valleys and to weed-infested and ruderal places.

Economic importance. Used in some countries as a salad vegetable and for preparation of a borschlike soup. Employed in popular medicine for treatment of contusions and wounds.

Section 7. *CHENOPODIA* C. A. M. in Ldb. Fl. Alt. I (1829) 403 (p. p.); Kosteletzky, Allg. med. phar. Fl. V (1835) 1431. — Plants mostly farinose due to short bladdery hairs or glabrous; flowers normally 5-merous; perianth segments distinct to the middle or down to base; seeds horizontal, rarely in abnormal cases oblique or vertical; stigmas 2, short; embryo annular.

Series 1. Undata Aellen et Iljin. — Seeds with irregular gaps in the reticulum and an acute ridgelike margin.

12. *C. polyspermum* L. Sp. pl. (1753) 220; Fenzl in Ldb. Fl. Ross. III, 693; Shmal'g., Fl. II, 366; Kryl., Fl. Zap. Sib. IV, 882; Il'in in Fl. Yugo-Vost. IV, 138. — *C. angustifolium* Gilib. Exerc. Phyt. II (1792) 437. — *Oligandra atriplicoides* Less. in Linnaea IX (1834) 199. — *Lipandra atriplicoides* Moq. Chenop. (1840) 19. — Ic.: Syreishch., Ill. Fl. Mosk. g. II, p. 83; Rchb. Ic. Fl. Germ. XXIV, t. 236, f. 1—7. — Exs.: HFR no. 433.

Annual, 10—100 cm high, glabrous, with erect or ascending stem; leaves except the lowermost alternate, petiolate, ovate or oval or spatulate, the upper ones lanceolate, all entire, rounded-cuneate at base, acute or obtuse, mucronate or retuse; flowers in both axillary and terminal verticillate-spiciform inflorescences, perfect, 5-merous; perianth segments oval short-pointed or emarginate, glabrous or with scattered glands; stamens 1—3, more rarely 5; seeds round, 0.75—1 mm in diameter, depressed, blackish-brown, lustrous, obscurely reticulate with radially elongate pits; pericarp thin, scarious, rather inconspicuously closely radially rugose. July—September. (Plate 3, Figure 4).

Sandy river bluffs, shores, limans, weed-infested places and refuse dumps. — European part: throughout; Caucasus: throughout; W. Siberia: U. Tob., Irt., Ob, Alt.; E. Siberia: Ang.-Say., Lena-Kol. (adventive). Gen. distr.: throughout Europe, Asia Minor. Described from W. Europe. Type in London.

Note. This species can be readily divided into two varieties: var. *acutifolium* Beck. = *C. acutifolium* Sm. Comp. Fl. Brit. (1800) 42; *C. marginatum* Sprg. in Hornm. Hort. Hafn. 1 (1807) 256; *C. polyspermum* α *spicatum* Moq. Chenop. (1840) 19 — a pale green often

reddish-tinged plant with an erect stem, commonly acute leaves, and a compact spikelike inflorescence; var. *cymosum* Cheval — a dark green plant with ascending or decumbent stems, obtuse leaves, and a loose inflorescence.

Economic importance. The young shoots are used in some localities as a vegetable. The plant provides a popular remedy for headaches. Used by fishermen as a bait. The ash of this plant is rich in potash.

13. *C. murale* L. Sp. pl. (1753) 219; Fenzl in Ldb. Fl. Ross. III, 702; Shmal'g., Fl. II, 368. — *C. lucidum* Gilib. Exers. phyt. II (1792) 440. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 245, f. 1—5. — Exs.: H. F. A. M. no. 229.

Annual, 30—100 cm high, mostly dark green, glabrous or merely on youngest leaves farinose, branched; stem erect; leaves alternate, long-petioled, ovate-rhombic, mostly as broad as long, rarely more elongate lance-rhombic, acute or acuminate, cuneately narrowed at base, irregularly and coarsely dentate, somewhat lustrous, paler beneath; flowers in a paniculate inflorescence, perfect, 5-merous; perianth segments keeled, entire, mostly farinose, enclosed in fruit; seeds round, 1—1.5 mm in diameter, depressed, with acute margin and a small depression near the hilum, black, somewhat lustrous, almost smooth; pericarp scarious, finely grooved. July—September. (Plate III, Figure 7).

Weed-infested places and refuse dumps. — European part: U. V. (?), V.-Don (Kharkov), Bl., Crim.; Caucasus: E. Transc.; Centr. Asia: Syr D., Pam.-Al., Mtn. Turkm. Gen. distr.: throughout W. Europe, Afr., As. Min., Arm.-Kurd., Iran., Ind.-Him., Aust., Am. Described from W. Europe. Type in London.

Economic importance. Eaten in France as a salad vegetable. The seeds have been used in times of famine as a substitute for bread.

Series 2. *Grossefoveata* Aellen et Iljin. — Seeds with large deep pits and rounded margins.

14. *C. hybridum* L. Sp. pl. (1753) 219; Fenzl in Ldb. Fl. Ross. III, 702; Turcz. Fl. baic.-dah. II, 2 (1856) 18; Shmal'g., Fl. II, 367; Kryl., Fl. Zap. Sib. IV, 886; Il'in in Fl. Yugo-Vost. IV, 139. — Ic.: Syreishch., Ill. Fl. Mosk. g. II, p. 84; Rchb. Ic. Fl. Germ. XXIV, t. 243, f. 1—6 et t. 244, f. 1. — Exs.: HFR no. 227.

Annual, 25—100 cm high, glabrous, with simple or branched stem; leaves alternate, long-petioled, ovate to triangular-ovate, mostly thin, rarely turgid (f. *crassiusculum* Zapal. Consp. Fl. galic. crit. II (1908) 154), sinuate-dentate, with 1—4 long-pointed teeth on each side, rarely entire (f. *subintegrum* Moq. in DC. Prodr. XIII, 2 (1849) 68), slightly cordate or rounded-subtruncate or rarely cordate-hastate at base (f. *hastatum* Peterm. Fl. Lips. (1838) 200), acuminate; flowers in a loose paniculate inflorescence, perfect, 5-merous; perianth segments obtuse or emarginate, covered with sessile often short-stalked glands or these confined to the branches of inflorescence; seeds round, 1.5—2 mm in diameter, depressed, black, rather dull, rather shallowly reticulate-pitted, bluntly keeled on the margin; pericarp thin, scarious, smooth, with pits duplicating those of the seed. July—September. (Plate III, Figure 6).

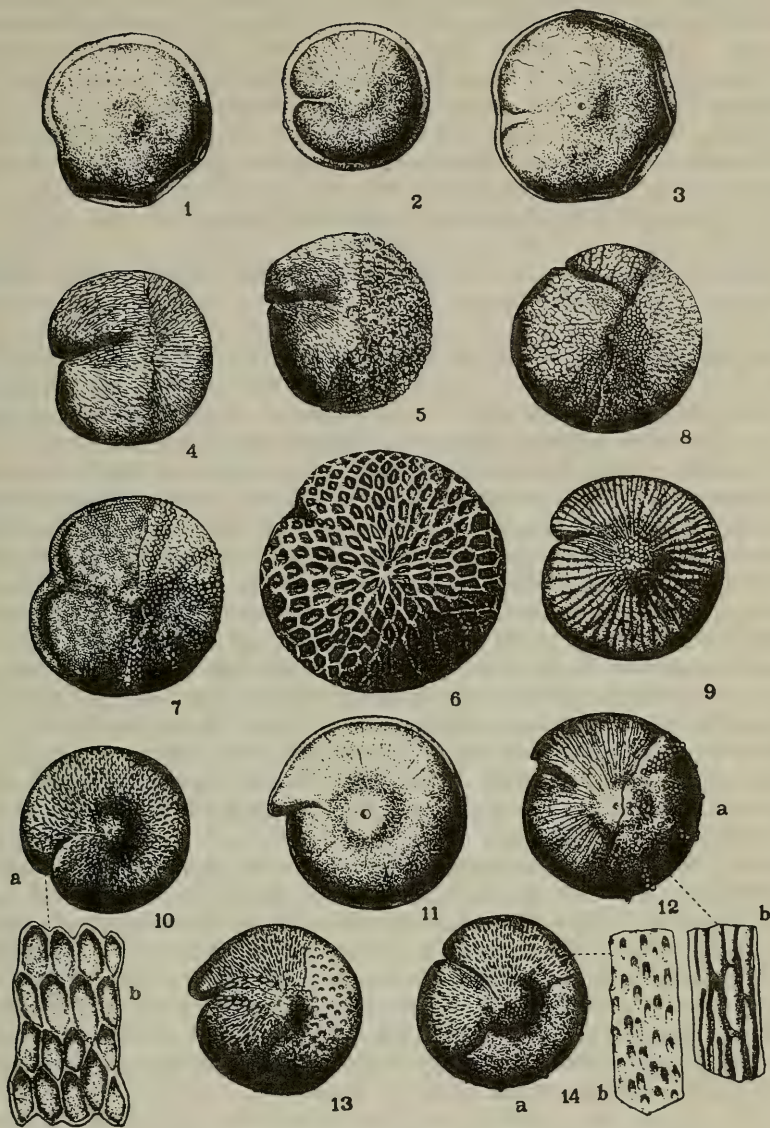


PLATE III. Seeds: 1. *Chenopodium botrys* L. — 2. *C. aristatum* L. — 3. *C. foliosum* (Moench) Asch. — 4. *C. polyspermum* L. — 5. *C. urticum* L. — 6. *C. hybridum* L. — 7. *C. murale* L. — 8. *C. frutescens* C.A.M. — 9. *C. bryoniaefolium* Bge. — 10. *C. serotinum* L.: a) general view of the seed, b) a fragment of sculpturing. — 11. *C. acuminatum* Willd. — 12. *C. album* L.: a) general view of the seed, b) a fragment of sculpturing. — 13. *C. klinggraeffii* (Abromeit) Aellen. — 14. *C. viride* L.: a) general view, b) a fragment of sculpturing. (Seeds in figures 4, 5, 7, 8, 12, 13, and 14, with a portion of the scarious pericarp on the right).

Woods and gardens, weed-infested places and refuse dumps. — European part: throughout except Kar.-Lap. and Dv.-Pech.; Caucasus: Cisc., Dag., S. and E. Transc.; W. Siberia: Ob (S.), U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Lena-Kol., Dau.; Far East: Ze.-Bu., Uss., Uda; Centr. Asia: Ar.-Casp., Balkh. (rare), Dzu.-Tarb., T. Sh., Pam.-Al. Gen. distr.: throughout Europe, N. Afr., Dzu.-Kash., Ind.-Him., Tib., Mong., Jap.-Ch. (Manchuria, Korea), N. Am. Described from Europe. Type in London.

Economic importance. Stramonium-scented, it contains the active element leucine (chenopodin), $C_6H_{13}NO_2$, and is poisonous to swine. A popular remedy for erysipelas and a general analgesic.

Series 3. *Acuminata* Aellen et Iljin. — Species of this series differ from all the others in having a pellucid leaf margin.

15. *C. acuminatum* Willd. in Schrift. d. naturf. Gesellsch. z. Berlin II (1799) 124; Fenzl in Ldb. Fl. Ross. III, 694; Turcz. Fl. baic.-dah. II, 2 (1856) 17; Kryl., Fl. Zap. Sib. IV, 882. — Ic.: Willd., l. c., t. 5, f. 2; Ldb. Ic. pl. Fl. Ross. II, t. 168. — Exs.: Kar. et Kir. pl. soong. no. 1908.

59 Annual, 10—50 cm high, with an erect branched stem, farinose in upper part; leaves alternate, petiolate, ovate or rhombic-ovate, the lower ones obtusish, terminating in a short often caducous tip, the upper ones acute, all entire, commonly narrowly red-rimmed at the margin, rounded at base or more rarely cuneately narrowed into the petiole, mostly farinose beneath; flowers in leafless spikelike inflorescences forming a pyramidal panicle, 5-merous; perianth segments keeled, enveloping the fruit; seeds horizontal, rounded or rounded-oval, 0.75—1.25 mm in diameter, depressed from the top, with a sharp-keeled margin, black, lustrous; pericarp thin, scarious, farinaceous. June—September. (Plate III, Figure 11).

Sands, stony slopes, sandy pine woods, and weed-infested places. — W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Yenis. (rare), Ang.-Say., Dau.; Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Mong., Jap.-Ch. Described from Altai. Type in Berlin.

Note. This species is usually separated into four forms, according to leaf shape: *f. ovatum* (Fenzl) Aellen (= var. *ovatum* Fenzl in Ldb. Fl. Ross. III (1851) 695), with relatively large leaves broadly rounded or subtruncate at base; *f. virgatum* (Moq.) Aellen (= v. *virgatum* Moq. in DC. Prodr. XIII, 2, 1849, 63), with smaller leaves broadly cuneate-tapering into the petiole; *f. farinosum* Aellen, with all leaves heavily farinose especially beneath; and *f. pusillum* Fenzl in Ldb. Fl. Ross. III (1851) 695, characterized by very low growth, oblong obtuse leaves, and spikelike inflorescence interrupted at base.

16. *C. vachelii* Hook. et Arn. Bot. Beech. (1841) 269. — *C. acutifolium* Hook. et Arn., l. c., 207. — *C. acuminatum* var. *vachelii* Moq. in DC. Prodr. XIII, 2 (1849) 63.

Annual, 10—15 cm high, with mostly reddish erect branched stem; leaves lanceolate to linear-lanceolate, entire, with pellucid margin, narrowed to a short petiole, acuminate at apex, green and glabrous above, grayish-farinaceous beneath; inflorescences terminal, spikelike, leafless except near the base, the rachis covered with bladdery botuliform hairs;

perianth segments distinct to the base, keeled, with occasional bladdery hairs; seeds round, 1—1.3 mm in diameter, black, lustrous, smooth with fugacious sculpturing; pericarp scarious, mostly somewhat pustulose or almost smooth.

Coastal rocks. — Far East: Uss. Gen. distr.: Jap.-Ch. Described from China and the Ryukyu Islands.

Series 4. *Lejosperma* Aellen et Iljin. — Testa more or less smooth.

17. *C. urbicum* L. Sp. pl. (1753) 218; Fenzl in Ldb. Fl. Ross. III, 701; Shmal'g., Fl. II, 367; Turcz. Fl. baic.-dah. II, 2 (1856) 19; Kryl., Fl. Zap. Sib. IV, 887; Il'in in Fl. Yugo-Vost. IV, 140. — *C. melanospermum* Wallr. Sched. crit. (1822) 112. — *C. chrysomelanospermum* Zuccani in Roem. Collect. (1809 ?) 134. — Ic.: Syreishch., Ill. Fl. Mosk. g. II, p. 84; Rchb. Ic. Fl. Germ. XXIV, t. 246, f. 1—6 et t. 247, f. 1—3. — Exs.: Sennen Pl. d'Espagne, no. 440.

Annual, 25—100 cm high, glabrous, sometimes the youngest parts but slightly farinaceous, rarely the leaves strongly farinose beneath (*f. incanum* Beck. in Rchb., l. c.); stem erect, simple or branched; leaves alternate, petiolate, triangular or triangular-hastate, acute, truncate at base or more often cuneately narrowed to the petiole from an obliquely notched base, coarsely and slopingly sinuate-dentate on the margin or rarely subentire, somewhat indurated, on both surfaces pale green, the upper ones narrower; flowers in a compressed inflorescence, more rarely a loose broader one (*f. cymosum* Ludwig in Asch. et Gr. Syn. V (1913) 37), perfect, 5-parted; perianth segments ecarinate, obtuse or emarginate, glabrous; seeds ca. 1 mm in diameter, rarely to 0.75 mm (*f. microspermum* Asch. et Gr., l. c., p = *C. microspermum* Wallr. Sched. crit. (1822) 112), black, lustrous, smooth, with faint reticulation; pericarp thin, scarious, short-papillose. July—September. (Plate III, Figure 5).

Rubbish dumps and roadsides; growing in groups. — European part: throughout except Kar.-Lap. and Dv.-Pech.; Caucasus: throughout; W. Siberia: throughout; E. Siberia: Yenis., Ang.-Say., Dau.; Far East: Ze.-Bu. (?), Uss.; Centr. Asia: Ar.-Casp., Balkh., Pam.-Al. (Kabadian). Gen. distr.: throughout W. Europe, As. Min., Arm.-Kurd., Iran., Dzu.-Kash., Mong., Manch. Described from W. Europe. Type in London.

Note. This species occurs in two main varieties: var. *vulgare* Neilr. Fl. Wien (1846) 190 (= *C. urbicum* α *deltoideum* Neilr. Fl. Niedev.-Oesterr. (1859) 279. = *C. melanospermum* Wallr. Sched. crit. (1882), 122. = *C. urbicum* α *melanospermum* Asch. Fl. prov. Brand. I. (1864) 569) — leaves triangular, about as long as broad, shortly rounded or obtusely cuneate at base; and var. *intermedium* Koch, Syn. ed. 1 (1837) 605 = *C. intermedium* Mert. et Koch Deutsch. Fl. II (1826) 297 = *C. rhombifolium* Mühl. ex Willd. Enum. Hort. Berol (1809) 288 = *C. urbicum* var. *rhombifolium* Moq. Chenop. (1840) 32). — leaves markedly longer than broad, long-tapering at base into the petiole.

Economic importance. A ruderal plant widely distributed in southern regions. The leaves are sometimes used like spinach and the seeds sometimes serve as a substitute for millet.

18. *C. frutescens* C. A. M. in Ldb. Fl. Alt. I (1829) 408; Fenzl in Ldb. Fl. Ross. III, 695; Kryl., Fl. Zap. Sib. IV, 884. — Ic.: Ldb. Ic. pl. Fl. Ross. I, t. 10.

61 Undershrub, 10–40 cm high, with the odor of rotten herrings (trimethylamine), particularly noticeable when inflorescences are crushed; stem short, woody, rather slender, grayish, bearing rather short ligneous branchlets, the grayish-farinoso shoots unbranched or slightly branched; leaves alternate, ovate or oval, obtusish or more often acute, at base rounded or narrowed to a short petiole, entire, thickish, grayish-farinoso; flowers in a rather compact spiciform-paniculate leafless inflorescence, perfect, 5-merous; perianth segments elliptic, farinose, sharply keeled; seeds horizontal, round, slightly depressed, 1–1.5 mm in diameter, blackish-brown, glabrous and lustrous, with a blunt margin, obscurely sculptured; pericarp thin, scarious, whitish, farinaceous. July–August. (Plate III, Figure 8).

Gravelly, solonchic, and sandy-solonchic desert steppes. — W. Siberia: Alt. Gen. distr.: Mong. Described from the Chuya Steppe near Kosh-Agach. Type in Leningrad.

Economic importance. Contains trimethylamine (C_3H_9N).

19. *C. album* L. Sp. pl. (1753) 219; Shmal'g., Fl. II, 367; Il'in in Fl. Yugo-Vost. IV, 141; Fenzl. in Ldb. Fl. Ross. III, 2 (1851) 697; Turcz. Fl. baic.-dah. II, 2, 19; Kom. Fl. Mandsh. II, 153; Boiss. Fl. Or. IV, 901; Kryl., Fl. Zap. Sib. IV, 885. — Ic.: Kom. and Alis., Opred rast. Dal'nevost. kr. I, fig. 145 A; Syreishch., Ill. Fl. Mosk. g. II, p. 85. — Exs.: H. F. A. M. no. 109.

Annual, 10–300 cm high, mostly strongly branched, nearly always clearly farinose; leaves oval-deltoid to oblong-deltoid, more rarely lanceolate, the largest unevenly toothed, more rarely entire, the lowest tooth often enlarged into a 1–3-parted lobe, the middle division more or less uniformly tapering, acute or rarely with more or less parallel margins and then obtuse or rounded, the base of the blade cuneate or rounded, tapering to a petiole of varying length, the apex clearly apiculate; glomerules disposed in spikelike inflorescences forming a much branched leafy panicle, or in axillary and terminal almost leafless cymose inflorescences; perianth segments keeled; perianth easily detached, lurid, smooth or pustulose-farinose; seeds ca. 1–1.25 mm in diameter, black, lustrous, with faint radial grooves or almost smooth, with rather acute margin. July–September. (Plate III, Figure 12 a–b).

A common weed of field and garden crops, also refuse dumps, roadsides, etc. — Abundant in all regions of the USSR, rarer in Arctic regions, chiefly in river valleys. Gen. distr.: cosmopolitan. Described from Europe. Type in London.

62 Note. A species extremely variable in all its parts, containing many known varieties and forms. We shall indicate only the principal varieties occurring in the Soviet Union: 1) var. *ealbum* Ludwig. s. str. in Schinz u. Keller. Fl. Schw. II, 1914, 95. (= *C. album* subsp. *ealbum* Ludw. in Asch. et Gr. Syn. V, 1913, 40, pro parte) — leaves ranging in shape from deltoid to lanceolate, clearly longer than broad, mostly with a larger and sometimes double lowest tooth but not markedly 3-lobed, gradually attenuate toward apex — widely distributed throughout the USSR; 2) var. *borbasii* (Murr.) Ludw. in Schinz. u. Keller. Fl. Schw. II (1914) 95 (= *C. borbasii* Murr. Prog. Oberr. Innsbr. 18991, 56) — large leaves, scarcely longer than broad, the low-seated lateral lobes broad and 2-parted, the short and broad middle lobe sinuate-dentate, with almost parallel margins and apiculate from an obtuse apex; inflorescence compact — occurring in the Caucasus;

3) var. *microphyllum* Boenn. Fl. Monast. (1824) 77 (= *C. concatenatum* auct. (pp.), non Thuil. = *C. album* var. *concatenatum* auct.) — mostly smaller in all parts; leaves long-petioled, longer than broad, acuminate, entire or with occasional sharp teeth and then deltoid in outline, or with only the lowest tooth developed and then oval-elliptic; seeds ca. 0.8 mm in diameter — this variety occurring in its typical form in the North German Plain, appearing sporadically and not always readily distinguishable from the next variety; 4) var. *novopokrovskyanum* Aellen (= *C. leptophyllum* Murr. in Mag. Bot. Lap. II, 1903, 5, non Nutt.) — coarsely branched erect plants 40–60 cm high, mostly in all parts, at least initially, heavily farinose; leaves broadly oval-lanceolate to lanceolate, 3 cm long and 1 cm broad, rounded at both ends, with 1 minute tooth below the middle, mucronate, with a basal pair of veins and distant remaining veins in the middle and upper part of the blade (cf. *C. leptophyllum*), the petiole less than half as long as the blade; glomerules in leafless pyramidal terminal or in leafy axillary inflorescences except at the summit; perianth segments narrow, almost winged-keeled, broadly white-margined, stellately spreading in fruit; pericarp more easily detached in var. *ealbum*; seeds small, conspicuously grooved, ca. 0.75 mm in diameter — occurring in the European part of the USSR, in Kazakhstan, the steppe part of W. Siberia, and Central Asia; 5) var. *pseudoficifolium* Turcz. in Bull. Mosc. XXV (1852) 411 — a large plant with virgate branches; lower leaves slightly 3-lobed, the short lateral lobes acute and toothlike, the middle lobe ligulate; inflorescence spiciform-paniculate — occurring in Ang.-Say. and Dau.; a species closely resembling this variety, *C. rugosum* Aellen in Fedde Repert. sp. nov. XXV (1928) 215, was reported from the Yenisei Valley, but it differs in larger and longer stellately spreading narrow perianth segments; 6) var. *stenophyllum* Makino Tokyo Bot. Mag. XXVII (1913) 28 (= *C. stenophyllum* Koidzumi in Bot. Mag. XXXIX, no. 468, 1925, p. 305; *C. virgatum* Thunberg in Nov. Act. Reg. Soc. Sc. Upsal. (1815) 143) — a large plant, to 150 cm high, divaricately branched at base, the branches arcuate, the upper ones shorter and erect, almost appressed to stem; leaves to 7 cm long and 2 cm broad, long acuminate from a lance-ovate base, mostly closely and unequally toothed, with lower teeth sometimes more or less lobelike, farinaceous or glabrous beneath; flowers in long narrow leaves spikelike inflorescences; perianth segments grayish-farinaceous, united to one-third, slightly keeled, not quite enclosing the fruit; pericarp light brown, easily detached; seeds nearly 1 mm in diameter, with faint radial grooves and finely rugose — in the USSR only in the Far East.

Economic importance. A most common weed, sometimes difficult to eradicate. In the past, the young shoots were used as a vegetable and the seed as a cereal in famine years. The leaves are used in the U. S. A. like spinach. In prehistoric times this plant was cultivated, like certain other goosefoot species. The seeds contain 15–16% nitrogenous compounds, 37–38% nitrogen-free substances, 6% fats, and 17–18% cellulose. Other analyses show 9.76% water, 11.8 nitrogenous compounds, 36.5% nitrogen-free, 3.8% fats, and 15% cellulose; or again, 10.92% water, 4.58% mineral content, 17.60% nitrogenous compounds, with 16.94% albumin, 6.93% fats, 21.45% cellulose, and 49.44% nitrogen-free extract. Ash composition (Brusyanin): K_2O – Na_2O 43.96%, CaO 6.66%, MgO 8.68%, F_2O_3 0.38%, P_2O_5 24.68%, SO_3 5.10%, SiO_2 1.31%, Cl 2.09%, as well as traces of Mn and CO_2 . These figures indicate a high content of nutrients but their assimilability

is, unfortunately, rather low. Moreover, ingestion of larger quantities brings about disturbances of the nervous system and gastric pains. Analysis of the herbage shows 80.8% water, 3.94% and 8.93% nitrogenous and nitrogen-free substances, respectively, 3.8% cellulose, 0.76% fats, and 3% ash content. Other constituents include leucine (chenopodin), betaine, volatile oil, and paracholesterine. Fragments of the plant often find their way with bran into cattle feed. In view of their high starch content, the seeds may be used for distillation. The plant is of importance in popular medicine for treatment of angina and abdominal pains. Continued consumption of goosefoot grain causes loss of weight and decrease in the nitrogen content of the organism (N. Sul'menev). The vegetative parts yield a red dye.

20. *C. opulifolium* Schrad. in Koch u. Ziz. Cat. pl. Palat. (1814) 6 (nomen nudum); Fenzl in Ldb. Fl. Ross. III, 2, 696; Krylov, Fl. Zap. Sib. IV, 885; Il'in in Fl. Yugo-Vost. IV, 142. — *C. album* *B. opulifolium* G. F. W. Mey. Chlor. Hannov. (1836) 465. — *C. album* var. α Shmal'g., Fl. II, 368. — Ic.: Fl. Yugo-Vost. IV, fig. 255. — Exs.: F. Schulz, Fl. Gall. et Germ. exs. no. 923.

64 Annual, 25–120 cm high, mostly divaricately branched; leaves 2–4 cm long, nearly as broad as long, distinctly 3-lobed, the lateral lobes broad, the short 2–6-toothed or rarely entire middle lobe obtuse or somewhat acutish or apiculate, both surfaces of the blade farinose (in forms growing in shade almost glabrous), the petiole nearly as long as the blade; upper leaves narrower and acute; inflorescence loosely paniculate or compact, perianth mostly farinaceous, the narrow segments slenderly keeled; pericarp easily detached, light brown; seeds 1–1.25 mm in diameter, black, lustrous, with unequal radial grooves and scattered obscure depressions. July–September.

A weed of cultivated fields, especially of row crops; also refuse dumps, roadsides, etc. — European part: M. Dnp., U. Dnp. (S.), Bl., Crim., V.-Don (S.), Transv. (S.), L. Don, L.V.; Caucasus: Cisc., Transc.; W. Siberia: Irt. (S.?), Alt. (Charysh River area ?); Far East: Uss. ?; Centr. Asia: Mtn. Turkm. Gen. distr.: Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from Europe.

Note. Very rarely the leaf lobes are undeveloped and reduced to teeth: var. *orientale* Beck. in Rchb. Ic. Fl. Germ. XXIV (1909) 102 (= *C. opulifolium* subsp. *orientale* Murr. in Mag. Bot. Lap. I (1902) 339, t. 1, f. 5). Known from Turkmenia and Transcaucasia.

Economic importance. As for the preceding species.

21. *C. strictum* Roth in Nov. pl. sp. praes. Ind. or. (1821) 180; Aellen in mag. Bot. Lap. (1928) 105.

Annual, to 200 cm high, with an erect branched stem; lower branches decumbent with ascending tips; upper branches virgate, arising at an acute angle; stem and branches mostly reddish-striped or red throughout; leaves at most ca. 5 cm long and 2 cm broad, deltoid-oval, unevenly rounded, toothed, somewhat attenuate toward apex and acute or else broadly lanceolate almost toothless, with more or less parallel margins, shortly narrowed at base, rounded at apex; upper leaves lanceolate to linear; all leaves apiculate,

in xerophytic forms red-rimmed, farinaceous, mostly dark green; glomerules very small, olivaceous or dull green, glabrous or farinose, mostly terminal, more rarely cymose; perianth segments united at base, with a rather inconspicuous green midrib and a broad white rim, not fully covering the fruit; pericarp easily detached, lurid; seeds ca. 1 mm in diameter, black, radially grooved, slightly punctate-pitted and finely rugose. August–September.

65

Weed infested places. — European part: Lad.-Ilm., U. Dnp., M. Dnp., Bl., V.-Don, L.D., Transv., L.V.: Caucasus: Cisc., Dag., throughout Transc.; W. Siberia: U. Tob.; Far East: Uss.; Centr. Asia: T. Sh., Pam.-Al., Syr D., Mtn. Turkm. Gen. distr.: Scand. (adventive), Atl. Eur. (adventive), Med., Bal.-As. Min., Iran., Ind.-Him., Ch., Abyssinia, Tenerife Island, N. and S. Am. (adventive). Described from India.

Note. This species is apparently represented in the USSR by only one race, subsp. *striatum* (Krašan) Aellen et Iljin comb. nova (= *C. striatum* Murr. in Deutsch. Bot. Monatsschr. XIV (1896) 32, t. 1, f. 1, a et b. = *C. album* var. *striatum* Krašan in Mitth. Naturw. Verein Steierm. XXX (1893) 254. = *C. striatum* A. krašani Asch. et Gr. Syn. V (1913) 63 = *C. album* β *striatum* c. *krašani* Beck. in Rechb. Ic. Fl. Germ. XXIV (1907) 105), characterized by many-flowered spiciform terminal inflorescences forming a pyramidal panicle.

22. *C. giganteum* Don, Prodr. Fl. Nepal. (1825) 75; Aellen in Ber. Schweiz. Bot. Ges. XXXVIII (1929) 14. — *C. amaranticolor* Coste et Reynier in Bull. Soc. Bot. France, 54 (1907) 178. — *C. album* subsp. *amaranticolor* Coste et Reynier in Bull. Soc. Rochel. (1904–05) et in Bull. l'Herb. Boiss. 2 sér. V (1905) 974, 976 et 979. — *C. purpurascens* Gadec. in Bull. Soc. Bot. Fr., 62 (1915) 288, non Jacq., Lam. vel Juss. — *C. hookerianum* Moq. in DC. Prodr. XIII, 2 (1849) 68.

A large and vigorous annual, to 200–300 cm tall; young shoots and leaves reddish, farinose, subsequently glabrous, turning gray in the herbarium; stems angled-sulcate; leaves large, to 15 cm long and nearly as broad, triangular to triangular-deltoid, short-truncate to subcordate at base, gradually decreasing in size, larger leaves doubly toothed with lobelike teeth of varying size; smaller leaves mostly regularly and sharply sinuate-dentate, apiculate; inflorescences more or less terminal, leafy only at base, forming together a loose panicle; perianth farinose, with keeled segments; pericarp loosely attached to seed, this ca. 1–1.25 mm in diameter, black, smooth. August–October (?).

Weed-infested places. — Far East: Uss. (Sovetskaya Gavan in the Tatar Strait). Gen. distr.: Ind.-Him., Ch.; adventive in Centr. Eur., Atl. Eur., Med., Scand., S. Afr., and S. Am. (Argentina). Described from Nepal.

Economic importance. An ornamental plant. A foliage vegetable of excellent quality, used like spinach and cultivated in many countries; easily naturalized. A rather warm climate is required for seed ripening.

22. **C. pratericola* Rydb. in Bull. Torr. Club. XXXIX (1922) 310; Aellen in Ostenia (1933) 90. — *C. leptophyllum* auct., non Nutt.

Annual, to 100 cm high, erect, branched, mostly grayish-white farinose
66 in all parts, rarely almost glabrous; largest leaves to 4 cm long and 1.5 cm
broad, oval-elliptic or broader, with obtuse toothlike lobes in lower third
(*f. leptophylloides* (Murr.) Aellen = *C. petiolare* var. *leptophyll-*
oides Murr. in Bull. Herb. Boiss. 2 sér. IV (1904) 994) or narrower,
linear-lanceolate to linear and entire (*f. thellungianum* Aellen), all
narrowed at both ends, apiculate, somewhat thickish, with midvein and
2 basal lateral veins; upper leaves narrower, entire; petiole short; inflores-
cence a compact panicle, rarely loose, with remote small grayish-white
glomerules; perianth segments narrow, slenderly keeled; pericarp light-
colored, easily detached; seeds ca. 1 mm in diameter, black, with more
pronounced radial grooves than *C. album* and with distinct transverse
grooves.

Weed-infested places. Not found in the USSR but likely to occur, being
distributed throughout Europe as an adventive plant. Native in North
America and adventive in South America. Described from specimens
collected in various places in the U. S. A., more particularly from Kansas.

23. *C. sosnowskyi* Kapeller in Monit. Jard. Bot. Tifl. nouv. sér. 3-4
(1927) 47.

Annual, to 70 cm high, with erect or ascending stem and spreading
branches, farinose, either green (*f. viride* Kapell., l. c.) or grayish (*f. vi-*
ridi-canescens Kapeller, l. c.); leaves entire, to 3.5 cm long and 3.5 cm
broad, short-cuneate or rounded-tapering at base, sometimes slightly
3-lobed with low-seated mostly simple acute or rounded lateral lobes, the
larger ones oval-deltoid to deltoid, the upper oblong-oval or lanceolate;
glomerules in spikelike interrupted leafless axillary or terminal inflores-
cences; perianth segments sharply keeled, covering the fruit; seeds ca.
1-1.4 mm in diameter, black, lustrous, relatively smooth, finely rugose with
shallow grooves and few distinct pits.

Ruderal sites; sometimes in gorges. — Caucasus: Cisc., Dag., Tal.,
Transc. Endemic (most probably occurring in Arm.-Kurd.). Described
from several locations in Transcaucasia, notably from Bakuriani. Type
in Tiflis [Tbilisi].

24. *C. bryoniaefolium* Bge. Del. Sem. Hort. Petrop. (1876) 10 et in
A. H. P. IX, 1 (1884) 398 et X, 2 (1889) 593; Kom., Fl. Manchzh. II, 151. —
C. ficifolium Bge. in Maxim. Prim. Fl. Amur. (1859) 222 (non Smith). —
C. atripliciforme Murr. in Mag. Bot. Lap. I (1902) 360. — Ic.: Murr.,
l. c., t. V, f. 17 (sub *C. atripliciforme*).

Annual, 30-100 cm high, with an erect green simple or branched stem;
leaves petiolate, thin, green on both sides, very sparsely farinose and
therefore paler beneath, triangular-hastate or oblongly ovate-hastate,
acute or very rarely obtusish, always entire, always broadly cuneate at
base, the spreading lobes of the hastate base sometimes additionally toothed;
uppermost leaves reduced, mostly oblong or oval, more heavily farinose
beneath; flowers perfect, in a broadly paniculate loose inflorescence; perianth
segments keeled, green, half-concealing the fruit; pericarp brownish,

thinly scarious, doubling the sculpturing of the seed; seeds horizontal, round, 1.25–1.75 mm in diameter, black, lustrous, mostly prominently reticulate with radially elongated cells. August. (Plate III, Figure 9).

Shaded rocks. — E. Siberia: Ang.-Say. (Krasnoyarsk: "Stolby" State Reserve), Dau.; Far East: Ze.-Bu., Uss. Gen. distr.: Jap.-Ch. Described from the Amur River. Type in Leningrad.

Note. Aellen also reports for Central Asia var. *kapelleriae* Aellen, which differs from the typical species in more developed mealiness, broader though small oval-deltoid leaves, and smaller seeds (0.75–1 mm) with faint sculpturing. It may be assumed that this is a distinct species.

25. *C. vulvaria* L. Sp. pl. (1753) 220; Fenzl in Ldb. Fl. Ross. III, 2, 695; Shmal'g., Fl. II, 367; Il'in in Fl. Yugo-Vost. IV, 139. — Ic.: Fedch. and Fler., Fl. Evr. Ross., fig. 247; Beck. in Rchb. Ic. Fl. Germ. XXIV, t. 237, f. 1–7. — Exs.: Fl. exs. Austro-Hung. no. 3849.

Annual, 10–60 cm long, with the odor of rotten herrings (due to trimethylamine), mostly grayish-green farinose; stem erect and divaricately branched or prostrate; leaves small, 2–4 cm long and 1–4 cm broad, sometimes much smaller (f. *microphyllum* Moq. Chenop. enum (1840) 24), deltoid-ovate, mostly entire, more rarely with a lobelike tooth at the broadest place (f. *rhombicum* Murr in Mag. Bot. Lapok II (1903) 11), obtusish, cuneate at base or rounded-tapering into petiole; inflorescences short, leafless, terminal, spikelike or paniculate, rather compact; perianth segments united to above the middle, slightly and narrowly keeled, farinose; pericarp pale yellow, easily detached, smooth or farinose, seeds 1–1.25 mm in diameter, black, lustrous, very faintly sculptured. July–September.

Weed-infested places. — European part: U. Dnp., M. Dnp., Bl., Crim., V.-Don, L. Don, L. V., Transv.; W. Siberia: U. Tob. (?), Irt. (?); Centr. Asia: Ar.-Casp. (?), Balkh. (?), Pam.-Al. (Samarkand). Gen. distr.: Scand.; Atl. Eur., Centr. Eur., Med., Bal.-As. Min., Aust. (adventive), N. Am. (adventive). Described from Europe. Type in London.

Economic importance. The plant contains trimethylamine (C_3H_9N). It is used in popular medicine for treatment of rheumatism, colds, and hysteria. According to Zalesovaya and Petrovskaya, it may replace valerian. The plant is also rich in potassium and phosphates, and it contains ammonium salts. A yellow dye is extracted from the vegetative parts.

Series 5. *Cellulata* Aellen et Iljin. — Upper surface of testa clearly honeycombed with almost hexagonal pits.

26. *C. viride* L. Sp. pl. (1753) 219; Aellen in Ostensia (1933) 100. — *C. album* β *viride* Wahlenb. Fl. Suec. (1824) 158 et auct. plur., plerumque pp. — *C. album* f. *pseudopulifolium* I. B. Schulz in Oest. Bot. Zeit. IV (1900) 97. — *C. album* subsp. *pseudopulifolium* Murr. in Festschr. Aschers. 70 (1904) 217. — *C. pseudopulifolium* Murr. ex Hayward and Druce in Adv. Fl. Tweedside (1919) 190. — *C. suecicum* Murr. in Mag. Bot. Lap. I (1902) 341. — *C. album* var. *pseudopulifolium* Abromeit,

Fl. Ost-Westpreuss. II, 2 (1917) 714. — Exs.: Pl. Finl. exs. no. 190; Herb. Fl. Ingr. no. 513c.

Annual to 100 cm high, branched, the lower branches arcuately ascending, the young shoots at first farinose, becoming glabrous or very rarely persistently farinose (f. *farinosum* (Murr.) Aellen et Iljin = *C. suecicum* var. *farinosum* Murr. secus Zobel Verz. Anh. Phaner. III (1909) 58); leaves commonly clearly 3-lobed, with 2 broad low-seated lateral lobes furnished with 2 acute principal teeth and 0–4 subsidiary ones, and a broad gradually attenuate sharply sinuate-dentate and mostly somewhat obtusish middle lobe, broadly cuneate at base; flowers in rather small loose spiciform-paniculate more or less terminal inflorescences; perianth segments keeled, farinose; pericarp whitish, firmly adherent to seed, seeds black, ca. 1 mm in diameter, with numerous relatively shallow radial grooves and honeycombed with unequally developed round or oblong pits, the margins of pits broad rounded and gradually sloping. June–October. (Plate III, Figure 14 a–b).

Weed-infested places. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. Dnp., M. Dnp., U. V., V.-Kama, L. V. (Astrakhan); W. Siberia: throughout; E. Siberia: throughout; Far East: throughout. Gen. distr.: Scand., Atl. Eur., Centr. Eur. Described from Europe. Type in London.

Note. A frequently occurring hybrid — *C. album* L. × *C. viride* L. (= *C. fursajevii* Aellen et Iljin. = *C. eualbum* × *pseudopulifolium* Ludwig in Asch. et Gr. Syn. V, 1913, 56), inheriting from the first species the narrowly deltoid leaf shape and the position of the teeth (more toward the middle rather than at the base as in *C. viride*), and from the second the numerous and acute leaf teeth; glomerules of medium size, in a loose paniculately cymose farinose inflorescence; seed sculpturing intermediate in character: radial furrows (*C. album*), as well as impressed flexuous lines and indistinct unequal pits (*C. viride*), the features of the latter species being less in evidence owing to the influence of the smooth testa of *C. album*. The hybrid appears to be of frequent occurrence wherever the two parental species grow side by side.

Economic importance. As for *C. album* L.

27. *C. jennissejense* Aellen et Iljin, sp. nova in Addenda V, p. 661.

Annual, 5–30 cm high, with erect or more often spreading stems and branches; lower leaves soon turning yellowish or reddish and promptly deciduous, to 4 cm long and 2.5 cm broad, oblong-deltoid to oval-deltoid, 3-lobed; lateral lobes simple, toothlike or doubly toothed, about the middle of the blade, gradually acuminate or with almost parallel margins, with 1 or 2 teeth in upper part, sometimes round-tipped, apiculate, green or sparingly farinaceous on both sides; inflorescences mostly compact, spikelike; perianth segments scarious, slightly keeled, obscurely farinaceous, loosely enveloping the seed; pericarp brownish, firmly adherent to seed; seeds 1–1.25 mm in diameter, black, somewhat rough-granulate, often obsoletely pitted, with faint radial grooves and wavy impressed lines.

River valleys in the forest-tundra and the extreme N. part of the forest belt. — European part: Dv.-Pech.; W. Siberia: Ob; E. Siberia: Yenisei, Lena-Kol. Endemic. Described from Turukhansk. Type in Leningrad.

28. *C. prostratum* Bge. ex Herder in A. H. P. X (1889) 594. — *C. karoi* Aellen in Fedde Rep. sp. nov. XXVI (1929) 149 et XXVII (1929) 221. — *C. album* subsp. *karoi* Murr. in Neue Übers. Farn.- u. Blütenpfl. Vorarlb. Lichtenst. (1923) 97.

Annual, mostly small, to 30 cm high, strongly branched, with long spreading prostrate branches in lower part, mostly farinose in all parts, more rarely glabrous; leaves dull green, to 3 cm long and 2 cm broad, deltoid-oval, with an obtuse 1- or 2-parted lateral lobe at about the middle, rounded at base; middle lobe gradually narrowed toward apex, entire or sparsely and obtusely toothed, slightly rounded at apex and mucronate; flowers in axillary glomerules or the inflorescences spikelike or cymose, scarcely leafy; perianth segments slightly keeled; pericarp adherent to seed; seeds ca. 0.75–1 mm in diameter, black, with deep radial grooves and distinctly honeycombed with oblong or irregular pits, rarely almost smooth.

Weed-infested places. — W. Siberia: Alt.; E. Siberia: Yenis. (S.), Ang.-Say., Dau., Lena-Kol.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. (Samarkand District). Gen. distr.: Dzu.-Kash., Tib., Mong. Described from two locations in Yakutia: from the Anui River valley and from Nizhne-Kolymsk. Type in Leningrad.

Note. A closely related species, *C. pamiricum* Iljin sp. nova (in Addenda V, p. 661) occurs in the Pamir. The description of this species has not been included in the general text, since it was only prepared at the time when this book was at the proofreading stage.

29. *C. klinggraeffii* (Abromeit) Aellen in Fedde Rep. sp. nov. XXVI (1929) 159 et XXVII (1929) 221. — *C. album* var. *klinggraeffii* Abromeit, Fl. Ost.-Westpr. II, 2 (1917) 712. — *C. album* var. *hastatum* Klinggräff in Veg. Verh. Preuss., 2 (1866) 130; Il'in in Fl. Yugo-Vost. IV, 142. — *C. album* subsp. *hastatum* Murr. in Festschr. 70 Geb. (1904) 219. — *C. hastatum* Murr. in Mag. Bot. Lap. I (1902) 360 (non Dumort. et Philippi). — Ic.: Murr., l. c., t. 5, fig. 18.

Annual, 10–50 cm high, mostly yellowish-green, often turning yellow in drying, all parts slightly farinaceous or glabrate; stem erect, with branches arising at an acute angle; lower leaves large, to 5–8 cm long and 3–5 cm broad, long-petioled, deeply 3-lobed; lateral lobes in lower third of the leaf, with large mostly acute straight and spreading or in upper part curved teeth, often with smaller vertical teeth; middle lobe gradually acuminate or more rarely with more or less parallel margins due to 2 larger recurved teeth near the apex; apex acute and apiculate; upper leaves hastate or entire; inflorescences sparsely leafy, terminal, mostly spikelike or pyramidal-paniculate; perianth segments broadly marginate, slightly rounded-keeled, loosely enveloping the fruit, light-colored or lurid; pericarp whitish, firmly united with the seed; seeds ca. 1–1.25 mm in diameter, black, mostly with deep radial grooves, pitted and more or less distinctly ridged, sometimes rather smooth or else almost granular. (Plate III, Figure 13).

Alluvial sands and pebbles in river valleys. — European part: U. Dnp., M. Dnp. (?), Bl. (?), L. Don, V.-Don, L. V., Dv.-Pech., U. V., V.-Kama,

Transv.; Caucasus: Cisc. ([former] Sal'sk District); W. Siberia: U. Tob. (Ural'sk), Ob (S.), Irt. (Semipalatinsk); E. Siberia: Yenisei, Ang.-Say., Lena-Kol. Gen. distr.: rare and adventive in W. Europe. Described from the Vistula River valley in [former] East Prussia. Type in Königsberg [Kaliningrad].

Note. The distribution of this species in the USSR has not yet been fully determined. There is no doubt, however, that it occurs along all the major Soviet rivers except in the extreme southeast of the European part, of the Caucasus, and of Central Asia.

- 71 *29. *C. berlandieri* Moq. Chenop. (1840) 23 et in DC. Prodr. XIII, 2 (1849) 63; Aellen in Fedde Rep. spec. nov. XXVI (1929) 50. — Commonly occurring only subsp. *zschackei* Zobel. Verz. Anhalt Phanerog. III (1903) 70; Aellen in Fedde Rep. sp. nov. XXVI (1929) 51. — *C. zschackei* Murr. in Deutsch. Bot. Monatschr. XIX (1901) 39 (as *C. album* × *opulifolium*). — *C. berlandieri* var. *zschackei* Murr. in Festschr. 70 Geb. (1904) 227. — *C. album* auct. amer. pp., non L. — Ic.: Murr. in Deutsch., l. c., t. I, f. 1c.

Annual, to 180 cm high, strongly branched, mostly yellowish-green, sometimes whitish-farınose, with reddish spots at the nodes; largest leaves somewhat fleshy, ovate or elliptic, mostly slightly 3-lobed; lateral lobes at about the middle of the blade, simple or 2-parted, often merely toothlike; middle lobe rounded toward apex, entire or few-toothed, apiculate; inflorescence mostly paniculate, more rarely cymose; perianth segments strongly winged-keeled; pericarp firmly adherent to the seed; seeds ca. 1 mm in diameter, black, mostly honeycombed with 4 – 6-angled sharply straight-margined pits, devoid of radial grooves. July–September.

Cultivated fields and refuse dumps. Not yet discovered in the USSR, but most probably does occur in this country. Gen. distr.: N. Am., Mexico, W. Europe (adventive). Described from Mexico. Type in Paris.

30. *C. serotinum* L. Cent. pl. II (1756) 12 (p. p.). — *C. ficifolium* Sm. Fl. Brit. I (1800) 276; Fenzl in Ldb. Fl. Ross. III, 2, 696; Shmal'g., Fl. II, 368; Il'in in Fl. Yugo-Vost. IV, 143. — Ic.: Fl. Yugo-Vost., fig. 256. — Exs.: Fl. gall. et germ. exs. no. 31 (cent. 4).

Annual, 3 – 170 cm high, diffusely farinaceous becoming glabrous, branched; leaves to 8 cm long and 5.5 cm broad (the largest), 3-lobed; lateral lobes between the lower third and fifth of the blade, shorter than the middle lobe, simply toothed, narrow, acute, more rarely in vigorous specimens 2-lobed with smaller lower teeth; middle lobe long, narrow, with parallel margins, remotely sinuate-serrate or more rarely entire, obtuse or subacute, often subapiculate; leaf base commonly broad-cuneate, rounded; inflorescences many-flowered, in small specimens not surpassing the subtending leaves, in larger ones strongly branched, loose; flowers small, globular, the slightly keeled and mostly farinose segments enclosing the fruit; pericarp almost colorless, rarely lemon-yellow, firmly adherent to the seed; seeds small, 0.8 – 1 mm in diameter, black, regularly honeycombed, the 4- to many-angled oblong pits with sharp or rarely somewhat flattened margins, lateral grooves wanting (exceptionally

occurring in East Asian specimens). June – September. (Plate III, Figure 10 a – b).

72

Wet places in river valleys, shaded ruderal sites, potato fields, truck gardens and more rarely cultivated fields. – European part: L. Don (Kharkov?), L. V. (Leninsk, Astrakhan), Transv. (Ural'sk); W. Siberia: Alt. (?); E. Siberia: Yenisei (Selivanova), Ang.-Say. (Krasnoyarsk), Dau., Lena-Kol.; Centr. Asia: Balkh. (Zaisan), Kyz. K. (Kara-Kalpak area), Syr D. (Dzhizakh), Pam.-Al. (Kokand). Gen. distr.: sporadically; Scand. (Denmark), Atl. Eur., Centr. Eur.; main distribution area – Med., Bal.-As. Min., Iran., Ind.-Him., Jap.-Ch. Described from Spain. Type in London.

Note. The distribution of this species has not yet been adequately determined because of the generally insufficient exploration of *Chenopodium* species of the *C. album* L. cycle.

★30. *C. hircinum* Schrad. Ind. Sem. Hort. Gött. (1833) 2. – Ic.: Mart. Fl. Bras. V, 1 (1864) t. 45.

Annual, to 120 cm high, malodorous, grayish-green, mostly heavily farinose in all parts; largest leaves thickish, as long as broad, strongly 3-lobed, cuneate at base; lateral lobes spreading, 2-parted; middle lobe shorter than in *C. serotinum*, broad, almost right-angled, sinuate-dentate, obtuse or more rarely subacute; upper leaves hastate; inflorescence spikelike or paniculate; perianth segments slightly but distinctly keeled; pericarp thickly scarious, firmly adherent to the seed; seeds ca. 1 – 1.25 mm in diameter, black, irregularly honeycombed with pits and with radial grooves between them. September – October.

Shaded, weed-infested places, gardens, etc. Although not yet recorded for the USSR, it most probably occurs in this country. Gen. distr.: Centr. Eur. (adventive), Atl. Eur. (adventive), Med. (adventive), S. Afr., S. Am. (native). Described from Brazil.

Economic importance. The plant contains essential oil. It has vermifuge properties.

★★30. *C. quinoa* Willd. sp. pl. I (1797) 1301. – Ic.: Engl. u. Prantl, Pflanzenf., 2 Aufl., 16c (1934) fig. 184.

Annual, mostly 40 – 100 cm high, or taller; stem stout and firm, unbranched in lower part, with erect or subappressed leafy branchlets above, strongly branched in the inflorescence; leaves long-petioled, mostly broad to oblong-triangular, usually clearly 3-lobed, the lower ones commonly to 6 cm long and 5 cm broad, the middle and upper ones narrower, broadly cuneate or (the upper ones) narrowly cuneate; inflorescence mostly very compact, forming a crowded panicle several decimeters long; perianth segments broad-ovate, keeled; seeds large, to 2 mm broad, with broad obtusish margins, whitish-yellow, with slender radial grooves.

73

Native in South America. Cultivated in the USSR (very rarely).

Economic importance. Cultivated for grain in South America (especially in Chile and Peru). In recent times also introduced into W. Europe. Growing trials have also been made in the Soviet Union. The seeds are used for bread baking. Analysis of the seeds has

given the following percentage composition: water 10.8 – 16, nitrogenous compounds 15 – 19, fats 4.5 – 6.5, nitrogen-free compounds 48 – 62, cellulose merely 1.7 – 8, ash 2.7 – 5.5, the content of starch, protein, sugar, and cellulose being 40–51, 17–20, 6, and 1.8 per cent, respectively. Saponin is also present in the seeds (7–10%) and in the herbage. Ash analysis of the seeds yields up to 77% of K_2O and P_2O_5 , the latter accounting for 0.85 – 1.37%. The foliage may be used as a substitute for spinach. The grain approaches rice in nutritive value; it contains vitamin B, but vitamins A, C, and D are absent. Quinoa acquires exceptionally high nutritive value when enriched with food products containing the missing vitamins (Mazzacco).

Genus 401. **MONOLEPIS*** SCHRAD.

Schrad, Index sem. h. Gotting (1833) 4.

Flowers perfect, intermixed with some pistillate ones, glomerate, rarely solitary; perianth mostly consisting of 1 segment, rarely 3-merous or wanting; stamen 1; ovary ovoid or globular, with 2 infundibular stigmas; seed vertical, with hippocrepiform or annular embryo, albuminous. Annual plants with alternate leaves. The genus contains about 6 species.

1. Perianth segments 3; small plants 2–4 cm in height. Pamir 2. *M. litwinowii* Pauls.
- + Perianth segment 1; plants 10–30 cm high. Arctic Siberia 1. *M. asiatica* Fisch. et Mey.

1. *M. asiatica* Fisch. et Mey. in Bull. phys.-math. Acad. de St. Pétersb. II (1844) 131; Fenzl in Ldb. Fl. Ross. III, 709.

Annual or biennial, 10–30 cm high, green, glabrous or with scattered mealy dots; stem usually with many long branches arising near base, hence plant apparently many-stemmed, elsewhere very sparingly branched; leaves oblongly rhombic-hastate, petiolate, mostly with horizontally spreading or obliquely spreading or obliquely ascending lobes in middle part, very gradually tapering to the petiole, sometimes with 1 or 2 additional teeth; radical leaves long-petioled, wilting at flowering time, the petiole many times the length of the blade; cauline leaves with shorter petioles; bracteal leaves narrower, often linear and subentire, spreading to pendulous; inflorescence leafy; flowers numerous, in axillary glomerules; perianth segment 1, oblong or broadly oblanceolate, persistent; stamen 1, inserted at the base of the perianth segment, the filaments long linear and flat, the anthers globose or transversely ovaloid-globular; ovary globose or globular-ovaloid, slightly compressed laterally, alveolate-vesicular, crowned by 2 filiform long-villous stigmas; fruit with somewhat inflated pericarp greatly in excess of the seed volume; seeds vertical, round, 0.75–1.2 mm in diameter, strongly compressed laterally, surrounded by a marginal band, brown, somewhat lustrous, smooth or obsoletely rugulose. July. (Plate II, Figure 6).

* From the Greek *monos*, solitary, and *lepis*, scale, alluding to the simple tepal.

In river valleys and, as a ruderal plant near resting places for cattle. — Arctic: Arc. Sib. (east of the Yenisei); E. Siberia: Lena-Kol. (extreme N.). Endemic. Described from Nizhne-Kolymsk. Type in Leningrad.

2. *M. litwinowii* Pauls. in Lieut. Olufs. sec. Pamir Exp. in Videnskp. Meddel. fra den naturh. Foren. i Khbvn. (1903) 187. — Ic.: l. c., p. 187, fig. 1 a-b.

Perennial, 2–4 cm high, whitish-mealy, covered below with remnants of old leaves; stem with long internodes, long-branched near base; radical leaves with petioles 2–3 cm long, triangular-hastate, unequally toothed, the teeth short and acute or terminating in minute reddish points; bracteal leaves hastate, with gradually shortening petioles, the uppermost hastate-linear and sessile; flowers 10–15 in glomerules; perianth of 3 segments united in lower part, the middle acute, the longer lateral ones obtuse; stamen 1, covered before anthesis by the middle segment; ovary ovoid, with 2 capillary stigmas; seeds castaneous, with horseshoe-shaped embryo. July.

Centr. Asia: Pam.-Al. Endemic. Described from the Muskol River valley. Type in Copenhagen.

Note. So far known only from one location. It may be assumed that this species is closely related to *Chenopodium foliosum* (Mnch.) Asch. and it may be merely a distinctive race of the latter.

Tribe 5. ATRIPLICEAE C. A. M. in Ldb. Fl. Alt. I (1829) 371. — Plants with unisexual flowers, monoecious or more rarely dioecious, exceptionally with some perfect flowers; flowers with a perianth or, especially the pistillate, without perianth; bracteoles always present, notably in the case of pistillate flowers; stamens 1–5; embryo annular. Annuals or undershrubs, mostly with bladdery or stellate hairs or glabrous.

75 Genus 402. **SPINACIA*** L. L.sp.pl. (1753) 1027; Gen. pl.ed. 5 (1754) 452.

Dioecious, annual or biennial plants; flowers in glomerules; staminate flowers with perianth of 4 or 5 segments and strongly exserted stamens, disposed in a spiciform-paniculate inflorescence; pistillate without perianth furnished with a 2–4-toothed involucre formed by united bracteoles, two opposite teeth fusing and covering the fruit as an indurated envelope, the 4 long filiform stigmas protruding through apertures in the envelope; segments of fruiting perianth free or united and forming corniculate fruit aggregates. The genus contains 3 species.

1. Segments of fruiting perianth free, with or without spiny outgrowths; cultivated plants *S. oleracea* L.
- + Segments of fruiting perianth united into spiny corniculate aggregates; wild plants 2.
2. Cauline leaves of pistillate plants sessile, half-clasping (Caucasus). 3. *S. tetrandra* Stev.
- + Cauline leaves of pistillate plants distinctly petiolate (Central Asia). 2. *S. turkestanica* Iljin.

* Possibly from the Latin *spina*, spine, in reference to the spiny fruits, but more likely derived from *ispanakh*, the Persian word for spinach.

1. *S. oleracea* L. Sp. pl. (1753) 1027; Shmal'g., Fl. II, 371; Il'in in Fl. Yugo-Vost. IV, 148. — *S. domestica* Borckh. in Rhein. Mag. 1 (1793) 481. — Ic.: Fl. Yugo-Vost. IV, fig. 257.

Annual or biennial, 25–50 cm high, glabrous, unbranched or branched, light green; radical and lower stem leaves long-petioled; lower and middle leaves triangular-hastate, sometimes with rather elongated lateral lobes, or oblong-ovate, entire, very rarely with occasional teeth, obtuse, usually minutely mucronulate, always tapering to a petiole; upper leaves and occasionally the middle ones often acute, oblong, cuneate at base; staminate flowers in an interrupted spiciform-paniculate inflorescence, 4-merous, with 4 stamens, pistillate flowers in dense sessile axillary glomerules, the individuals flowers not united in fruit and falling separately in maturity; fruit 2-horned (var. *spinosa* Asch. et Gr. Syn. V (1913) 108 = *S. spinosa* Mnch. Meth. (1794) 318) or globose and hornless (var. *glabra* Gürke in Richter-Gürke. Pl. Eur. II (1897) 138 = *S. oleracea* β *inermis* Peterm. Pflzschlüss. (1846) 377; *S. glabra* Mill. Gard. Dict. ed. 8, no. 2 (1768); *S. inermis* Mnch.). (Plate II, Figure 7 a–b).

Cultivated and sometimes naturalized.

76

Note. Bisexual specimens occur occasionally among the unisexual plants of the cultivated species. As a rule, the fruits of this species are separated, but specimens with somewhat united fruits are to be found; these do not, however, form true aggregates as in the other species of the genus. Garden spinach is native in Iran. It has given rise in cultivation to a number of varieties which differ chiefly in leaf shape and in leaf surface (crisp or smooth), consistency, leafiness of the stem, time of flowering, etc. Crisp-leaved varieties: Victoria, Juliana, Savoy, smooth-leaved: Pozdnostvolyashchiysya (slow-bolting), Hollandia, Flanders, Gaudry, Viroflay, Triumph, Rostovskii.

Economic importance. Cultivated as a vegetable, used as a pot-herb and as an article for the canning industry. It contains a considerable amount of the vitamins A, B, and C, iron and phosphorus. On a dry weight basis, it contains about 34% crude protein, about 33% nitrogen-free compounds, and 4.5% fat. As regards protein content it is inferior only to meat. It is therefore considered as an important food for rachitic children, and for old and anemic people. In recent times a substance called spinach-secretin has been produced by hydrolysis from fresh leaves; its action is similar to that of pilocarpine in that it stimulates glandular secretion of the mucous membrane of the stomach and the action of the pancreas.

2. *S. turkestanica* Iljin in Sorn. rast. SSSR II (1934) 113; Acta Inst. Bot. Ac. Sc. URSS, ser. 1, II (1936) 123. — *S. tetrandra* Minkw. in O. et B. Fedtsch., Consp. Fl. Turk. VI (1916) 208 et auct. As. mediae plur., non Stev. — Ic.: Opr. rast. Tashk. 2 (1924), fig. 124 (sub *S. tetrandra*). — Exs.: H. F. A. M., no. 230; Sintenis, It. transcasp.-pers. 1900–01, no. 73 a and c. (sub *S. tetrandra*).

Annual, 10–60 cm high, glabrous, very diffusely farinaceous; root slender; stem simple or slightly branched and then mostly with elongated branches in lower part, often stoutish; radical and lower cauline leaves with very long petioles, runcinate, with a larger triangular-hastate terminal lobe

and oblong or linear lateral lobes, usually mucronulate at apex; upper leaves with shorter petioles, often merely triangular-hastate, sometimes 1 or 2 uppermost lanceolate; inflorescence of staminate plants a panicle composed of axillary and terminal interrupted and almost leafless spikes; pistillate inflorescence leafy; perianth of staminate flowers with 4 oblong-oval segments, sometimes with 2 or 3 teeth at summit; anthers borne on strongly exerted filaments; pistillate flowers in the axils of nearly all leaves except the radical, with hornlike outgrowths, united in fruit into a spiny-corniculate aggregate of mostly 4–6, measuring 10–15 mm in diameter, the envelope smooth (*f. laevis* (M. Pop.) Iljin) or rugose (*f. rugosa* (M. Pop.) Iljin); horns commonly lanceolate, 3-angled, channeled above, mostly 5–8 mm long, very rarely broadly triangular-ovate and to 3–4 mm long (*var. brevispina* Iljin). April–May. (Plate II, Figure 9).

Weed-infested places (cotton fields, irrigated and unirrigated wheat, etc.), refuse dumps and ruderal sites, sometimes sand-and-pebble and wormwood wasteland in loess foothills. — Centr. Asia: Balkh. (S. foothills), Kara K. (near mountains), Mtn. Turkm., Syr D. Gen. distr.: Iran. Described from the vicinity of Katta-Kurgan in Samarkand Region. Type in Leningrad.

Economic importance. Used by the Uzbeks for food and known by them as "ismalak." Widespread weed of various crops, confined to foothills, chiefly in the loess belt.

3. *S. tetrandra* Stev. in *Mém Soc. Nat. Mosc.* II (1809) 182; Fenzl in Ldb. *Fl. Ross.* III, 712. — *S. minor* C. Koch in *Linnaea* XVII (1843) 311.

Annual, 10–40 cm high, glabrous; stems erect or ascending, simple or more often branched, the branches especially in lower part elongated and often ascending; radical leaves rosulate; rosette leaves and lower cauline leaves long-petioled, mostly runcinate, lyrate, or pinnatifid, the obtuse lobes obsoletely mucronate; cauline leaves of staminate plants short-petioled, nearly always more divided than those of pistillate plants; the latter clearly sessile, somewhat clasping, oblong-ovate and mostly simple or more rarely slightly lobed; flowers of male plants in many-flowered glomerules disposed in interrupted spikes in the axils of upper leaves or terminal and almost leafless; staminate perianth segments 4, ovate or oblong-ovate, connate in lower part; stamens 4, the long filaments strongly exerted; pistillate flowers glomerate in the axils of all leaves including the radical, united in a woody spiny head, the very long stigmas protruding in groups of 4 through small openings; aggregates falling together with leaves, spiny-corniculate, 8–10 mm in diameter, glabrous, the broadly 3-angled horns 2–3 mm long. April–May. (Plate II, Figure 8).

Stony steppe slopes. — Caucasus: S. and E. Transc. Gen. distr.: Arm.-Kurd. Described from the Kura River valley in Transcaucasia. Type in Leningrad.

Genus 403. **ATRIPLEX***L.

L. Gen. pl. ed. 5 (1754) 472.

Flowers unisexual; plants monoecious, rarely dioecious; staminate flowers mostly 5-merous, rarely 3- or 4-merous, with perianth and 5 stamens; pistillate flowers nearly always without perianth, enclosed in 2 free

* Name of the plant already used by Pliny.

or united bracteoles; ovary with 2 stigmas; rarely some of the flowers have a perianth but no bracteoles; seeds horizontal in flowers with perianth, vertical in flowers without perianth; embryo annular; heterocarpy is a characteristic feature. Leaves alternate or opposite, well developed, simple or divided. Annuals or undershrubs. The genus contains about 250 species.

1. Fruiting bracteoles connate to the summit, without any distinct seam; leaves undivided and entire (Section 5. *Halimus* C. A. M.) 2.
- + Fruiting bracteoles free or partly united but distinct at least at the margin, never bicorniculate 3.
2. Bracteoles bicorniculate, resembling the fruit of shepherd's purse; stems very long 32. *A. pedunculata* L.
- + Bracteoles ovate, convex, hornless or merely minutely 3-toothed at the summit 33. *A. fera* (L.) Bge.
3. Fruiting bracteoles quite free or connate only at base, without prominent nerves 19.
- + Bracteoles connate at least in lower part, usually prominently nerved 4.
4. Bracteoles united nearly throughout or at least for most of their length, with only a narrow marginal portion distinct though often reduced to closely approximate double teeth, mostly becoming indurated or lignified (Section 4. *Obione* C. A. M.) 5.
- + Bracteoles united only in lower half or not becoming woody in their broad lower base, the apices distinctly separated (Section 3. *Sclerocalymma* Asch.) 11.
5. Undershrubs 6.
- + Annual plants 7.
6. Leaves opposite, undivided, entire 28. *A. verrucifera* M. B.
- 81 + Leaves alternate, mostly obtusely repand-toothed, more rarely entire 27. *A. turcomanica* Fisch. et Mey.
7. Fruiting bracteoles nutlike, very broadly winged on all sides, the wing entire 31. *A. moneta* Bge.
- + Fruiting bracteoles different from the preceding 8.
8. Fruiting bracteoles nutlike, strongly convex, prickly with a dense cover of aculeiform outgrowths on two sides; rarely some of the bracteoles flat and not prickly 9.
- + Fruiting bracteoles not prickly, nutlike but not convex 10.
9. Fruiting bracteoles all alike, prickly, nutlike, almost completely united except for closely contiguous small teeth at the summit, subsessile or short-stipitate 26. *A. sibirica* L.
- + Fruiting bracteoles stipitate, of two kinds: some nutlike, convex, prickly, united except for a narrow herbaceous toothed margin, others flat, not prickly, these occurring in smaller numbers 25. *A. centralasiatica* Iljin.
10. Fruiting bracteoles all alike, large, 10–20 mm across, flabellate, deeply notched at base, equally and deeply sinuate-dentate, with very prominent radial nerves 30. *A. flabellum* Bge.
- + Fruiting bracteoles in a compact leafless inflorescence, sessile, small 2–3 mm across, obovate, the lower axillary, larger but never reaching 10 mm in diameter, borne on a rather long thickened almost horny stipe 29. *A. thunbergiae* Boiss.

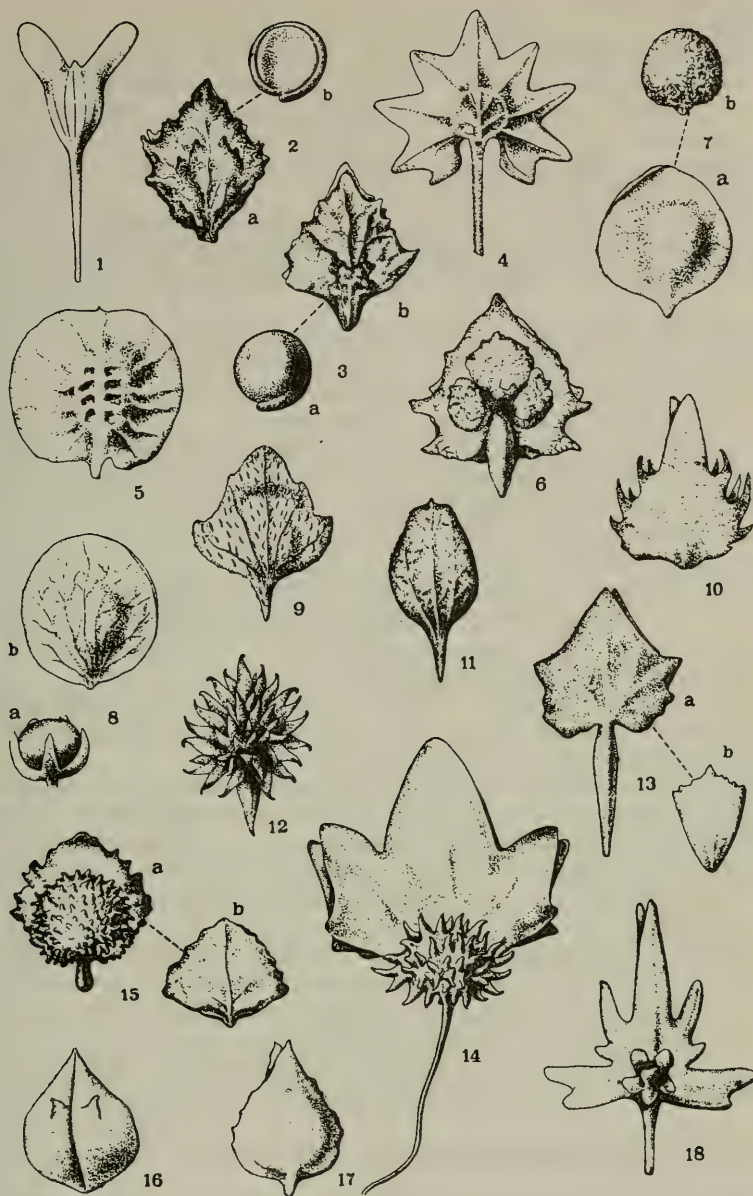


PLATE IV. 1. *Atriplex pedunculata* L.: pistillate flower in fruiting condition. — 2. *A. sphaeromorpha* Iljin: a) same; b) seed. — 3. *A. rosea* L.: a) and b) same. — 4. *A. flabellum* Bge.: pistillate flower in fruiting condition. — 5. *A. moneta* Bge.: same. — 6. *A. dimorphostegia* Kar. et Kir.: same. — 7. *A. heterosperma* Bge.: a) and b) types of pistillate flowers in fruiting condition. — 8. *A. nitens* Schkuhr: same. — 9. *A. pamirica* Iljin: same. — 10. *A. calotheca* (Rafin.) Fries: same. — 11. *A. fera* (L.) Bge.: same. — 12. *A. sibirica* L.: same. — 13. *A. thunbergiaefolia* Boiss.: a) and b) same. — 14. *A. megalothea* M.Pop.: same. — 15. *A. centralasiatica* Iljin: a) and b) same. — 16. *A. gmelini* C.A.M.: same. — 17. *A. nudicaulis* Boguslav.: same. — 18. *A. ornata* Iljin: same.

11. Undershrub with undivided leaves 23. *A. cana* C. A. M.
+ Annuals 12.
12. Bracteoles mostly 3-lobed, large, 10–45 mm long and 8–35 mm
broad, foliaceous in upper half, long-stipitate in fruit, the stipe often
up to 50 mm long 24. *A. megalotheca* M. Pop.
+ Bracteoles much smaller, sessile or distinctly short-stipitate . . . 13.
13. Flowers in spikelike leafless terminal and axillary inflorescence,
only the lowermost axillary 15.
+ Flowers glomerate in the axils of normal though reduced leaves. . 14.
- 82 14. Stems and branches glabrate, the tips of branches almost capillary;
bracteoles 3 or fewer in glomerules; seeds flat, concave at center . . .
. 17. *A. sphaeromorpha* Iljin.
+ Stems and branches commonly distinctly farinose; terminal branch-
lets thicker, not less than 1 mm in diameter; bracteoles 5–10 in
glomerule; seeds somewhat convex, without depression at center . . .
. 16. *A. rosea* L.
15. Fruiting bracteoles monochromatic, grayish-farinose throughout,
distinctly 3-lobed, united only at base, with tuberclelike appendages
on both sides; erect plants 20. *A. ornata* Iljin.
+ Bracteoles herbaceous-green in upper part, yellowish below, united
for most of their length 16.
16. Branches very slender, geniculately bent in upper part; leaves
linear or oblanceolate, point-tipped; on gypseous soils
. 19. *A. pungens* Trautv.
+ Plants different from the preceding 17.
17. Small plants, 5–25 cm in height; inflorescence with blackish-brown
scarious hairs (Pamir) 22. *A. pamirica* Iljin.
+ Inflorescence without blackish-brown hairs 18.
18. Leaves thin; inflorescences long, strongly interrupted; peduncles
long, almost capillary, leafless or very sparingly leafy, 1 or several
from axils of almost all the leaves 21. *A. schugnanica* Iljin.
+ Leaves thicker; inflorescences usually compact, solitary, the rela-
tively stout rachis leafy in lower part, terminal and in the axils of
upper leaves 18. *A. tatarica* L.
19. Pistillate flowers of two kinds, some with a 5-parted perianth and
a horizontal seed or without bracteoles and without perianth, with
vertical seed, enclosed in 2 rotund or oval entire bracteoles
(Section 1. *Dichrosperma* Dumort.) 20.
+ Pistillate flowers always without perianth, with vertical seed,
enclosed in a pair of bracteoles (Section 2. *Teutliopsis* Dumort.)
. 22.
20. Leaves, including the upper ones, green on both sides
. 2. *A. hortensis* L.
+ At least the upper leaves whitish- or grayish-farinose beneath or
on both sides 21.
21. Stem 4-angled, whitish-farinose; leaves commonly subentire, mostly
distinctly bicolor, thickish, often involute
. 3. *A. amblyostegia* Turcz.
- 83 + Stem terete or obtusely angled-sulcate, mostly green; leaves thin,
hastate-cordate, repand-toothed, grayish beneath (at least the upper
ones), green above, flat 1. *A. nitens* Schkuhr.

22. Plants rather tall; leaves ovate-hastate, with an elongated entire lobe; bracteoles orbicular or ovate, entire, with rounded margins, varying greatly in size 14. *A. heterosperma* Bge.
- + Plants different from the preceding 23.
23. Leaves strongly succulent, thickish 24.
- + Leaves thin 26.
24. Leaf blades about as broad as long; leaves farinose (Siberia, Kazakhstan) 7. *A. crassifolia* C. A. M.
- + Leaf blades decidedly narrower than long 25.
25. Leaves green on both sides, lanceolate to oblong-ovate, sometimes merely with hastate base, the basal lobes never retrorse 6. *A. patens* (Litw.) Iljin.
- + Leaves often silvery-farinose, hastate, with retrorse basal lobes 12. *A. hastata* L.
26. Lower leaves triangular-hastate, cordate or truncate at base, the basal lobes retrorse (those of the middle leaves spreading) 27.
- + Leaves not hastate or the basal lobes of lower hastate leaves obliquely antrorse or more rarely spreading but never retrorse . . . 28.
27. Fruiting bracteoles with long linear often crenate teeth (Baltic Sea) 13. *A. calotheca* (Rafin.) Fries.
- + Bracteoles with short teeth or entire 12. *A. hastata* L.
28. Leaves farinose, at least the upper ones on the undersurface . . . 29.
- + Leaves not mealy except occasionally the youngest 30.
29. Bracteoles stipitate; leaves ovate or broad-ovate, entire (Central Asia) 15. *A. dimorphostegia* Kar. et Kir.
- + Bracteoles sessile; leaves lanceolate or oblong, entire or toothed, green above, at least the upper ones farinose beneath 9. *A. oblongifolia* W. et K.
30. Leaves mostly oblong-rhombic with hastate base or even lanceolate, entire, the lower ones pendulous; commonly a weed . . . 8. *A. patula* L.
- + Plants different from the preceding; seacoasts or solonchaks . . . 31.
- 84 31. Leaves linear or lanceolate, thin, entire or equally serrate, upright; bracteoles mostly crenulate; continental or maritime plants . . . 32.
- + Leaves lanceolate to oblong-ovate, entire; bracteoles mostly entire; plants of northern seacoasts (Arctic and Pacific oceans, Baltic Sea) 33.
32. Fruiting inflorescence an interrupted spike; fruiting bracteoles ovate-rhombic, their margins not revolute 4. *A. litoralis* L.
- + Fruiting inflorescence very compact; fruiting bracteoles broad-ovate to suborbicular, their margins revolute in maturity (W. Siberia and E. Kazakhstan) 5. *A. laevis* C. A. M.
33. Fruiting bracteoles with an impressed medial nerve (Far East). 11. *A. gmelini* C. A. M.
- + Fruiting bracteoles without an impressed nerve (shores of the Baltic Sea and the Arctic Ocean) 10. *A. nudicaulis* Boguslav.

Section 1. *DICHROSPERMA* Dumort. Fl. Belg. (1827) 21. — Pistillate flowers of two kinds, some without perianth, with vertical seed, enclosed in 2 bracteoles, others with perianth and horizontal seed, without bracteoles.

1. *A. nitens* Schkuhr, Handb. III (1803) 541; Fenzl in Ldb. Fl. Ross. III, 716; Shmal'g., Fl. II, 372; Kryl., Fl. Zap. Sib. IV, 895; Il'in in Fl. Yugo-Vost. IV, 156. — *A. acuminata* W. et K. Pl. rar. Hung. II (1805) 107. — *A. hermanni* Willemet. Phytogr. III (1808) 1222. — *A. lucida* Desf. secus Mert. et Koch, Deutschl. Fl. II (1826) 311. — *A. hortensis* subsp. *nitens* Pons, Nuov. Giorn. Bot. Ital. N. S. IX (1902) 409. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 259, fig. 1–9; W. et K., l. c., t. 103; Maevskii, Fl. Sr. Ross., ed. 5, fig. 180; Syreishch., Fl. Mosk. gub. II, p. 90. — Exs.: Fl. Exs. Austro-Hung. no. 3852; Hayek. Fl. stir. exs. no. 1143; HFR no. 3073.

Annual, 60–150 cm high; stem simple or branched; leaves alternate except the lowermost, petiolate, triangular-ovate or lanceolate, coarsely sinuate-toothed, very rarely entire, hastate-sagittate or more rarely truncate or scarcely contracted at base, mostly acuminate, green and lustrous above, at least the upper ones grayish-farinose beneath; flowers in spikes forming a pyramidal panicle; staminate 5-merous; pistillate of two kinds, some with 5-parted perianth, ebracteolate, these in smaller numbers, others without perianth, tightly enclosed by a pair of bracteoles; 85 fruiting bracteoles much enlarged, rounded-oval, entire, glabrous, sessile, 0.5–1.5 cm in diameter; horizontal seeds 1–1.5 mm in diameter, convex, black, lustrous, the pericarp densely short-papillose; vertical seeds flat, dull, olivaceous, 3–4 mm in diameter. July–September (Plate IV, Figure 8 a–b).

Argillaceous and solonchak bluffs near rivers and lakes, wasteland, and weed-infested places. — European part: U. V., V.-Kama, U. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., E. Transc.; W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Mtn. Turkm., Syr D. Gen. distr.: Throughout W. Eur., As. Min., Arm.-Kurd., Iran., Dzu.-Kash. Described from Germany.

2. *A. hortensis* L. Sp. pl. (1753) 1053; Fenzl in Ldb. Fl. Ross. III, 716; Kryl., Fl. Zap. Sib. IV, 894; Il'in in Fl. Yugo-Vost. IV, 155. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 260, fig. 1–8; Syreishch., Fl. Mosk. gub. II, p. 90. — Exs.: Meinsh. Herb. Fl. Ingr. no. 521.

Annual, 60–150 cm high; stem erect, mostly branched; leaves, except the lowermost, alternate, petiolate, triangular, broadly hastate at base, entire or more rarely slightly toothed, mostly taper-tipped, green on both sides; flowers in spikes disposed in a leafless panicle; staminate 5-merous; pistillate of two sorts, some ebracteolate with a 5-parted perianth and without bracteoles, others without perianth, others enclosed by a pair of sessile or very short-stipitate bracteoles, these rotund or rounded-oval, entire, free; seeds of the former horizontal, convex, black, lustrous, 1–2 mm in diameter, those of the latter vertical, flat, olivaceous-brown, dull, 3–4.5 mm in diameter. July–September.

Ornamental and truck gardens, weed-infested and ruderal places, occasionally on solonchaks. — European part: throughout except Kar.-Lap., Dv.-Pech., and extreme N.; Caucasus: Cisc., E. Transc.; W. Siberia: Ob (S.), U. Tob., Irt., Alt.; Centr. Asia: Ar.-Casp. (?), Balkh. (?), Mtn. Turkm. Gen. distr.: Centr. and S. Eur. Apparently described from the Orenburg steppes (in Hort. Upsal. 1748 in deserto Orenburgensi, m Sp. pl. 1753 in Tataria). Type in London.

Economic importance. This species is grown in gardens, including truck gardens; it is used as a spinachlike pot-herb. Also a popular remedy for jaundice. The seeds have emetic and diuretic properties, yield a blue dye, and contain saponin.

Note. I have not seen the true *A. hortensis* L. either in Siberia or in Central Asia. The glabrous forms of *A. nitens* Schkuhr. are mostly mistaken for this species.

3, *A. amblyostegia* Turcz. Fl. baic.-dah. II, 2 (1856) 25. — ? *A. aucheri* Moq. Chenop. (1840) 51. — ? *A. argentea* Pall. sec. Steud. Nomencl. ed. 2, 1 (1840) 168. — *A. nitens* subsp. *desertorum* Iljin in Bull. Jard. Bot. Princ. URSS, XXVI, 4 (1927) 414; Il'in in Fl. Yugo-Vost. IV, 156. — *A. desertorum* Sosn. ex Grossg., Geobot. och. Mugansk. st. (1929) 61. — Exs.: Becker Fl. sarept. no. 586.

Annual, 30–100 cm high; stem sharply 4-angled, mostly strongly compressed at points of insertion of the opposite branches, commonly whitish-farinose, often curved; leaves alternate except the lowermost, petiolate, the lowest soon wilting, often sinuate-dentate and hastate, all the others mostly sparingly toothed or entire, ovate to oblong-ovate, somewhat thickish, usually slightly upfolded or with involute wavy margins, green above, almost silvery beneath with dense mealiness; flowers in long spiciform inflorescences, the staminate 5-merous; fruit subtended by bracteoles; seeds vertical, rounded-oval, entire, resembling those of the preceding species. July–September.

Solonchaks and clayey solonchaks slopes. — European part: Crim., Bl. (S. part), L. Don, L. V.; Caucasus: Cisc., Dag., E. Transc.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Mtn. Turk., Syr D. Gen. distr.: Asia Minor, Arm.-Kurd., Iran., Dzu.-Kash. Described from the vicinity of Lake Inder. Type in Leningrad.

Section 2. **TEUTLIOPSIS** Dumort. Fl. Belg. (1827) 20. — Section *Schizotheca* C. A. M. in Ldb. Fl. Alt. IV (1833) 306. — All pistillate flowers without perianth, enclosed by a pair of bracteoles, these free to the base.

4. *A. litoralis* L. Sp. pl. (1753) 1054; Fenzl in Ldb. Fl. Ross. III, 729; Shmal'g., Fl. II, 372; Kryl., Fl. Zap. Sib. IV, 899; Il'in in Fl. Yugo-Vost. IV, 157. — *A. salicina* Pall. It. I (1771) 495. — *A. maritima* Pall. It. II (1772) 289. — *Chenopodium littorale* Thunb. Act. Soc. Sc. Ups. VII (1817) 142. — *Schizotheca littoralis* Fourr. Ann. Soc. Linn. Lyon. N. S. XVII (1869) 143. — *A. hastata* subsp. *littoralis* Pons, Nuov. Giorn. Bot., Ital. N. S. IX (1902) 419. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 266, f. 1–10; Kom. and Alis., Opr. rast. Dal'nevost. kr. I, pl. 145, figs. 4–6. — Exs.: Herb. Fl. Ingr. no. 525; Rchb. Fl. Germ. exs. no. 352.

Annual, 25–75 cm high; stem erect and mostly green; branches upright, the lowest opposite and ascending; leaves alternate, linear-lanceolate and mostly entire (var. *angustissima* Moq. in D. C. Prodr. XIII, 2 (1849) 96 = *A. littoralis* var. *integrifolia* Fenzl, l. c.) or even lanceolate and then commonly sinuate-toothed with sharp upturned teeth (var. *serrata* Smith, Fl. Brit. III (1804), 1094 = *A. littoralis* var. *marina* Smith, Engl. Bot. (1800?), t. 708), acute, gradually narrowed to a short petiole, green on both sides;

flowers in long interrupted hairy spikes often forming a paniculate inflorescence; staminate flowers 5-merous; pistillate enclosed by a pair of bracteoles, these free nearly down to base, ovate-rhombic, mostly denticulate, rarely subentire; seeds 1.5—3 mm in diameter, flat, glabrous, brown or black. July—September.

Seacoasts, riverside bluffs, sandy saline habitats; sometimes a weed. — European part: M. Dnp. (E.), Transv., Bl., Crim. (?), L. Don, L. V.; Caucasus: Cisc., E. Transc.; W. Siberia: U. Tob., Irt.; Far East: Uss.; Centr. Asia: Ar.-Casp., Balkh. (rare). Gen. distr.: all W. Europe, As. Min., Iran. (?). Described from the northern seaboard of W. Europe. Type in London.

Economic importance. Sometimes used as a foliage vegetable.

5. *A. laevis* C. A. M. in Ldb. Ic. pl. Fl. Ross. I (1829) 10 et in Ldb. Fl. Alt. IV (1833) 311; Fenzl in Ldb. Fl. Ross. III, 728; Kryl., Fl. Zap. Sib. IV, 899. — Ic.: Ldb. Ic. pl. Fl. Ross. t. 41.

Annual, 25—60 cm high; stem erect, simple or more or less branched, glabrous; leaves alternate, lanceolate to sublinear, acuminate, narrowed to a short petiole, slightly repand-dentate or entire, glabrous on both sides, bright green; flowers in very dense cylindric leafless spikes forming a paniculate inflorescence; staminate flowers 5-merous; pistillate bracteolate; bracteoles semirovate; fruiting bracteoles broad-ovate to subrotund, broadly cuneate or rounded at base, free to the base, entire or more often serrulate, diffusely farinose on the back; seeds of two sorts, some black, lustrous, smooth, 1.25—1.5 mm in diameter, others yellowish-brown, ca. 2 mm in diameter.

Riverbanks and lakeshores. — W. Siberia: Irt., Alt. (SW); E. Siberia: Ang. Say., Centr. Asia: Balkh. Endemic. First described from the Irtys River area, apparently from the [former] Semipalatinsk District. Type in Leningrad.

6. *A. patens* (Litw.) Iljin in Bull. Jard. Bot. Princip. d. l'URSS XXVI, 4 (1927) 415; Il'in in Fl. Yugo-Vost. IV, 157; Grossg., Fl. Kavk. II, 63. — *A. littorale* var. *patens* Litw. in Sched. ad HFR V (1905) 12. — *A. patulum* var. *tataricum* Trautv. in Bull. Soc. Nat. Mosc. XL (1867) 55. — *A. crassifolium* Majewsk. (non C. A. M.) Fl. Sr. Ross., ed. 5 (1917) 525; Shmal'g., Fl. II, 373; Fedch. and Fler., Fl. Evr. Ross. 347; Taliev and other authorities of the European part of the USSR. — *A. littoralis* Kryl. (p. p.) Fl. Zap. Sib. IV (1930) 899. — Ic.: Fl. Yugo-Vost. IV, fig. 259. — Exs.: HFR no. 1236 (sub. *A. littorale* var. *patens* Litw.) et no. 3074 a—c.

Annual, 15—70 cm high, glaucescent; stem erect or ascending, simple or more often branched; leaves alternate except the lowermost, gradually narrowed to a petiole, oblong-ovate, oblong, or lanceolate, sometimes only hastate, fleshy, with concolor surfaces, lepidote, slightly darkening on drying, obtuse or acute, entire or sparingly toothed; flowers in compact spikes mostly forming a contracted panicle; staminate flowers mostly 5-merous; pistillate enclosed by a pair of bracteoles, these free nearly to the base, white hairy or subsequently glabrescent, broad-rhombic, denticulate or more rarely subentire, sagittate at base; seeds of two forms, some black, lustrous, convex, ca. 1 mm in diameter, others flat, olivaceous, ca. 2 mm in diameter. July—September.

Solonchaks. — European part: Transv, L. Don, L. V.; Caucasus: Cisc., Dag. (?), E. Transc.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K. Endemic. Described from near the village of Bazheevskoe in the [former] Balagansk District ["raion"] of the Irkutsk District ["okrug"] (sub. var. *patens* Litw.). Type in Leningrad.

7. *A. crassifolia* C. A. M. in Ldb. Ic. pl. Fl. Ross. I (1829) 11 et in Ldb. Fl. Alt. IV, 309; Fenzl in Ldb. Fl. Ross. III, 721; Kryl., Fl. Zap. Sib. IV, 897. — Ic.: Ldb. Ic. pl. Fl. Ross., t. 42.

Annual, 10—50 cm high, dark green; stem mostly erect, farinose especially toward summit; branches widely divergent, the lowest approximate opposite and mostly long-spreading; leaves alternate except the promptly deciduous lowest ones, petiolate, very fleshy, broadly hastate-triangular or broad-ovate with truncate or broadly cuneate base, entire or with 1 or 2 teeth on each margin, the upper ones oblong or lanceolate, these and the young leaves farinose; flowers glomerate in a paniculate inflorescence composed of mostly spreading leafless spikes; staminate 5-merous; pistillate bracteolate; fruiting bracteoles commonly broad-rhombic, with short thickish teeth on the margin, farinose, connate only at base, often appendaged on the back; seeds of two forms, some black, lustrous, 1.25—1.5 mm in diameter, distinctly reticulate, others brownish, dull, 1.5—2 mm in diameter, smooth. July—August.

Solonchaks. — W. Siberia: Irt., Alt. (S. W.); Centr. Asia: Ar.-Casp., Balkh. (N.). Endemic. Described from the area south of the Irtysh River, evidently from the Semipalatinsk District. Type in Leningrad.

8. *A. patula* L. Sp. pl. (1753) 1053; Fenzl in Ldb. Fl. Ross. III, 725; Shmal'g., Fl. II, 372 (p. p.); Kryl., Fl. Zap. Sib. IV, 898; Il'in in Fl. Yugo-Vost. IV, 160. — *A. australasica* Moq. Chenop. (1840) 59. — *A. procumbens* Jundz. Fl. lithuan. (1830) 78. — *A. agrestis* Schur, Enum. pl. Trans. (1866) 575. — *Schizotheca patula* Fourr., Ann. Soc. Linn. Lyon, n. s. XVII (1869) 143. — *Theutliopsis patula* Čelak. in Osterr. Bot. Zeitschr. XXII (1872) 168. — *A. hastata* subsp. *patula* Pons. Nuov. Giorn. Bot. Ital. n. s. IX (1902) 417. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 265, f. 1—10; Syreishch., Fl. Mosk. g. II, 91; Il'in in Fl. Yugo-Vost. IV, pl. 260, fig. A. — Exs.: Herb. Fl. Ingr., no. 522; HFR no. 3075.

Annual, 30—90 cm high; stem mostly erect and branched; leaves alternate except the lowermost, petiolate, entire or toothed, the lower ones mostly irregularly rhombic, broadly cuneate or more often hastate at base with obliquely upturned basal lobes (var. *erecta* Lange Haandb. 2. Udg. (1859) 640 = *A. erecta* Huds. Fl. Angl. ed. 1 (1762) 376 = *A. virgata* Scop. Delic. Insub. II (1787) 14 = *A. patula* γ *mixta* Coss. u. Germ. Fl. Paris 1 ed. (1845) 456 = *A. littoralis* δ *mixta* Moq. Chenop. enum. (1840) 60), elsewhere elongated, minutely point-tipped, with concolor surfaces, mostly green, pendulous, commonly oriented edgewise; upper cauline and ramal leaves narrower, lanceolate, ascending, or else all leaves lanceolate and entire (var. *angustifolia* Lange, Haandb. Danske Fl. 2. Udg. (1859) 640 = *A. angustifolia* Sm. Engl. Bot. t. 1774); flowers in compact spiciform inflorescences; staminate mostly 5-merous; pistillate enclosed

by a pair of bracteoles, these free nearly to the base, rhombic to ovate-rhombic, mostly hastate at base, acute, entire or sparingly toothed; seeds either convex, blackish-brown, 1—2 mm in diameter, or flatter and paler, 2—3 mm in diameter. July—September.

Roadsides, waste ground, riverbanks, and weed-infested places generally. — European part: throughout except extreme N.; Caucasus: throughout; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Yenisei, Lena-Kol., Ang.-Say, Dau. (?); Centr. Asia: Ar.-Casp. (rare), Balkh. (rare), Syr D. (distribution in Centr. Asia sporadic and as yet undetermined). Gen. distr.: throughout W. Eur., N. Afr., As. Min., N. Am. Described from Europe. Type in London.

9. *A. oblongifolia* W. et K. Pl. rar. Hung. III (1812) 278. — *A. tatarica* Schkuhr (non L.), Bot. Hand. IV (1808) 331; Moq. in DC. Prodr. XIII, 2, 96; Claus. in Beitr. z. Pflanzenk. VIII (1851) 251 et auct. plur. ross. — *A. patula* α *halolepis* Fenzl in Ldb. Fl. Ross. III (1851) 726. — *A. patula* var. *oblongifolia* Westerl. in Linnaea XL (1876) 169. — *A. campestris* Koch et Ziz. Cat. pl. Palat. (1814) 24. — *A. tatarica* β *campestris* Moq. in DC. Prodr. XIII, 2 (1849) 96. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 263, fig. 1—10; W. et K., l. c., t. 211; Fl. Yugo-Vost. IV, fig. 260. — Exs.: HFR no. 1340 (sub *A. patula* var. *oblongifolia*).

Annual, 15—90 cm high; stem erect, simple or branched, whitish-farinose toward summit; leaves alternate except the lowermost, mostly narrow, lance-oblong, tapering to a short petiole, acuminate, entire or sparingly toothed, commonly with very narrowly revolute margins, more rarely subsagittate, somewhat stiffish, bicolor due to mealiness of the underside, with a prominent midrib; flowers in spiciform inflorescences forming a pyramidal panicle; staminate mostly 5-merous; pistillate bracteolate; bracteoles short-stipitate or subsessile, ovate or ovate-rhombic, entire, free nearly to the base, mostly with rounded angles; seeds of two forms, some black, convex, 1.5—2 mm in diameter, others yellowish or brownish, flat, 3—4 mm in diameter.

Weed-infested and ruderal places, bluffs, riverbanks, solonchik steppes. — European part: U. Dnp. (S.), M. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V. (mainly the right bank); Caucasus: Ciscauc., Dag., E. Transc.; Centr. Asia: Dzu.-Tarb., T. Sh. Gen. distr.: Scand., Centr. Eur., Atl. Eur. (Belgium, Netherlands), Bal.-As. Min., N. Afr. Described by Schkuhr under the name *A. tatarica* from the Tatar ASSR, apparently from near the Volga, and under the name *A. oblongifolia* from the limestone of Mount Szimion in the Banat. Type of the latter in Prague.

10. *A. nudicaulis* Boguslav. in Lesn. Zhurn. 1 (1846); Erman's Archiv VI (1848) 65. — *A. praecox* Hülphers in Lindm. Svensk Fanerogamfl. (1918) 228. — *A. validum* Iljin in herb. Bot. Inst. Acad. Sc. USSR. — Ic.: Lindm., l. c., fig. 152.

Annual, 5—30 cm high, pale green, glabrous; stem simple or branched, erect or ascending; leaves oblong or lanceolate, more rarely oblong-ovate, nearly always entire, acute or rounded at apex, rarely obtusish, rounded at base or hastately to cuneately narrowed to a petiole, green and glabrous

on both sides, alternate except the lowermost; flowers in rather loose spiciform inflorescences; staminate 5-merous; pistillate enclosed by a pair of bracteoles, these free nearly to the base, broad-ovate to oblong-ovate, rounded or more often hastate-cuneate at base, entire or sparingly toothed, acute or acuminate, green, not stipitate, the midnerve never impressed; seeds either small, black, lustrous, convex, 1.5—2 mm in diameter, or compressed, duller, light brown or olivaceous, 2.5—3.5 mm in diameter. June—July. (Plate IV, Figure 17).

Sandy or pebbly coasts, and "laidy."* — Arctic: Arc. Eur.; European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm (?). Gen. distr.: Scand. Described from the vicinity of Arkhangel'sk. Type in Leningrad (Forestry Institute).

11. *A. gmelini* C. A. M. in Mém. Ac. Sc. St. Pétersb. sér. 6, II (1833) 160; Fenzl in Ldb. Fl. Ross. III, 732 (p. p.); Kom. and Allis., Opr. rast. Dal'nevost. kr. I, 476; Kom., Fl. Kamch. II, 72; Hultén, Fl. of Kamtch. II, 58. — *A. littoralis* var. *angustissima* Kudo, Fl. Paramush. p. 101 (according to Hultén).

91 Annual, 5—50 cm high, mostly pale green; stems erect or ascending, branched from the base or more rarely simple, the lower branches mostly elongated and prostrate; leaves alternate except the lowermost, petiolate, oblong or lanceolate, entire, acute or acuminate or more rarely obtusish, mostly rounded-tapering at base into petiole or more rarely broad-cuneate from a hastate base, concolor on the two surfaces, green, glabrous or nearly so; flowers glomerate in rather loose spiciform inflorescences; staminate 5-merous; pistillate enclosed by a pair of bracteoles, these free nearly to the base; fruiting bracteoles broad-ovate or triangular-ovate, mostly rounded or very broadly cuneate at base, entire or rarely with 1—3 obsolescent teeth, acuminate, often bulging on both sides of the impressed midnerve, at first farinose, finally glabrate, blackening in maturity; seeds of two forms, some small, black, lustrous, convex, 1.5—2 mm in diameter, others light brown, flat, 2—3 mm in diameter. August—September. (Plate IV, Figure 16).

Coastal pebbles and sand-and-pebble deposits. — Far East: Kamch., Okh. (?), Uss., Sakh. Gen. distr.: Japan (Kurile Islands), Ber., N. Am. Described from Sitka Island and Kotzebue Sound. Type in Leningrad.

Note. A species most closely related to the European maritime *A. nudicaulis* Boguslav., from which it differs in some rather insignificant characters.

12. *A. hastata* L. Sp. pl. (1753) 1053; Fenzl in Ldb. Fl. Ross. III, 721; Shmal'g., Fl. II, 372; Kryl., Fl. Zap. Sib. IV, 897; Il'in in Fl. Yugo-Vost. IV, 161. — *A. latifolia* Wahlb. Fl. Suec. II (1824—26) 660, — (?) *A. obtusa* Willd. Sp. pl. IV (1805) 964. — *A. deltoidea* Babingt. Prim. Fl. Sarn. (1839) 82. — *A. microsperma* W. et K. in Willd. Sp. pl. IV (1805) 964. — *A. triangularis* Willd. Sp. pl. IV (1805) 963. — *A. sackii* Rostk. et Schmidt, Fl. Sedin (1824) 401. — *Schizotheca hastata* Fourr. Ann. Soc. Linn. Lyon N. S. XVII (1869) 149. — *Teutliopsis hastata* Čelak., Öster. Bot. Zeitsch. XXII (1872) 168. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 261,

* [Russian "laidy" are the treeless parts of forests and tundra landscapes or low seacoast plains dissected by the tortuous rills.]

f. 1—4; Syreishch., Fl. Mosk. g. II, p. 92; Fl. Yugo-Vost. IV, pl. 260, fig. B. — Exs.: Fl. exs. reip. Boh.-Slov., no. 12 and 13; HFR no. 3072.

92 Annual, 20—100 cm high; stem erect or ascending, mostly branched, the opposite lower branches commonly prostrate; lower or rarely all leaves opposite, triangular-hastate, the lateral lobes spreading, the basal ones retrorse, entire or rarely toothed, truncate or subobliquely cordate at base, acute or acuminate, obliquely ascending, the middle ones lobed and suberect, the uppermost lanceolate and mostly lobeless, all petiolate, always concolor, green or more rarely almost silvery, not infrequently succulent (f. *salina* Wallr. secus Gren. et Godr. Fl. France III, 1855, 12); glomerules in a spiciform inflorescence; staminate 5-merous; pistillate enclosed by a pair of bracteoles, these free almost to the base, mostly sharply triangular and commonly entire, rarely with 1—3 small teeth, or else larger, 5—7 mm in diameter, greatly surpassing the fruit (var. *macrotheca* Rafin. Danm. Holst. Fl. II (1800) 239), or small and about the length of the fruit (var. *microtheca* Schum. Enum. Saell. II (1801) 299); seeds of the former compressed, brown, to 2 mm in diameter, those of the latter more convex, black, ca. 1 mm in diameter. July—September.

Solonchaks, saline meadows, weed-infested places (especially in cities), and ruderal sites. — European part: throughout except extreme N.; Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: Ob (S.), U. Tob., Irt., Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kyz. K. (?), Kara K. (?), Mtn. Turkm. (?), Syr D. (?). Gen. distr.: throughout W. Eur., N. Afr., As. Min., Arm.-Kurd., Iran., Dzu.-Kash., Mong. Described from Europe. Type in London.

Note. A. Hülphers in Lindman. Svensk. Fanerogamfl. (1918) 226, calls this species *A. hastifolium* Salisb., while referring the name *A. hastata* L. to the maritime species that we have described as *A. calotheca* Fries. We have not followed this author's procedure, which cuts across firmly established concepts, especially as the reasons for his decision are not given. The list of synonyms supplied by the author suggests, however, that in his view the Linnaean *A. hastata* L. referred to *A. calotheca* Fr., a Baltic species.

Economic importance. Young plants are sometimes used as a foliage vegetable. The plant is employed as a source of potash. The seeds have emetic and purgative properties (Rollov).

13. *A. calotheca* (Rafin.) Fries, Novit., Fl. Suec. Mant. III (1842) 164; Fenzl in Ldb. Fl. Ross. III, 722 (in adnot.). — *A. hastata* var. *calotheca* Rafin. Danm. og. Holst. Fl. II (1796) 240; Shmal'g., Fl. II, 373. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 262, fig. 1—7. — Exs.: HFR no. 1984.

Annual, 30—100 cm high; stem mostly erect and branched; leaves large, alternate, mostly triangular-hastate or rarely sagittate, with retrorse basal lobes, obliquely notched or truncate at base, deeply elongate-toothed, often with curved teeth, the middle ones hastate-lanceolate, the upper subentire; flowers glomerate, forming a paniculate inflorescence, this leafy in lower part; fruiting bracteoles often strongly enlarging, up to 2.5 cm long, hastate-triangular to cordate-triangular, elongate at apex, in lower part with elongated often linear entire or crenulate teeth, connate only at base;

seeds either black, lustrous, and smooth, 1.25—1.75 mm in diameter, or else larger, 2—2.5 mm in diameter, strongly compressed, brown, reticulate. July—September. (Plate IV, Figure 10).

Seacoasts, especially sandy ones. — European part: Lad.-Ilm. (Petergöf [Petrodvorets]). Gen. distr.: Scand., Atl. Eur. (Scotland). Described from Denmark under the name *A. hastata* var. *calotheca*.

93

14. *A. heterosperma* Bge. Reliq. Lehm. (1851) 272. — *A. hastata* var. *heterocarpa* Fenzl in Ldb. Fl. Ross. III (1851) 724. — *A. hastata* var. *heterosperma* Rgl. in herb. Bot. Inst. Ac. Sc. URSS; Il'in in Fl. Yugo-Vost. IV (1930) 161. — *A. hastata* var. *salinum* Kryl. (non Wallr.) Fl. Zap. Sib. IV (1930) 898. — *A. micranthum* C. A. M. in Ldb. Fl. Alt. IV (1833) 308. — Ic.: Ldb. Ic. Fl. Ross. I, t. 43 (sub *A. micrantha*).

Annual, 50—150 cm high; stems erect, mostly branched; leaves alternate except the lowermost, petiolate, triangular-ovate or triangular-oblong, with hastate or truncate or scarcely narrowed base and shortly spreading basal lobes (there is often a pair of small retrorse subsidiary lobes), taper-tipped at apex, entire, the upper narrower and lobeless, all somewhat succulent, almost concolor and glabrous on both sides; flowers in a pyramidal panicle; staminate 5-merous with bracteoles free to the base; fruiting bracteoles rotund or ovate with rounded margins, always of two sorts, some small, completely filled with the black lustrous smooth seed, 1.25—1.5 mm in diameter, others large, tawny, flat, dull, 2—3 mm in diameter, with seed occupying but a part of their volume. August—September. (Plate IV, Figure 7).

Solonchak meadows, banks of brackish rivers, solonetzic waste ground, etc. — European part: Transv., L. V.; Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Mtn. Turkm., Syr D. Gen. distr.: Dzu.-Kash. Described from the area between Buzuluk and Ural'sk. Type in Leningrad.

15. *A. dimorphostegia* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 438; Fenzl in Ldb. Fl. Ross. III, 730. — *A. bracteosum* Trautv. in A. H. P. 1 (1871) 17. — *A. transcaspica* Bornm. et Sint. in Herb.; Ulbrich Chenop. in Engl. u. Prantl, Pflanzenf. 2 Aufl. Bd. XVI c (1934) 514 (nomen).

Annual, 5—40 cm high, grayish-green, divaricately branched; stem whitish, glabrous when mature; leaves alternate except the lowermost 1—3 pairs, petiolate, only the upper ones sessile; leaf blade ovate to broad-ovate, with rounded base tapering off to the petiole, mostly obtuse, entire, initially farinose, becoming glabrous; flowers glomerate in the axils of upper reduced leaves; staminate 4-merous; fruiting bracteoles broadly triangular to rotund, sometimes strongly 3-lobed (f. *bracteosa* (Trautv.) Iljin), mostly notched at base, distinctly stipitate, often with lateral auricles and with 1—3 teeth on each side, otherwise entire, the surface often appendaged; seeds of two forms, some brownish-red, convex, lustrous, 1.25—2 mm in diameter, others tawny, flat, dull, 2—2.5 mm in diameter. April—May. (Plate IV, Figure 6).

94

Sands, often sandhills, margins of takyrs, chalk, gravelly soil. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Amu D., Syr D. Gen. distr.:

Dzu.-Kash., Iran. Described from the vicinity of Lake Kli near Sassyk-pastau spring. Type in Leningrad.

Section 3. *SCLEROCALYMMMA* Aschers. Fl. Prov. Brandb. I (1864) 578. — Pistillate flowers without perianth, enclosed by a pair of bracteoles united in lower half and prominently nerved.

16. *A. rosea* L. Sp. pl. ed. 2 (1763) 1493; Fenzl in Ldb. Fl. Ross. III, 717 (p. p., excl. pl. alt. et jeniss.); Il'in in Fl. Yugo-Vost. IV, 162; Shmal'g., Fl. II, 373. — *A. laciniata* M. B. (non L.) Fl. taur.-cauc. III (1819) 641. — *Spinacia fera* Pall. It. I (1776) 496. — *A. alba* Scop. Delic. Isubr. II (1787) 16. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 267, f. 1–10. — Exs.: Fl. exs. Austro-Hung. no. 3852; HFR no. 3077a–c.

Annual, 30–90 cm high, divaricately branched from base, whitish-farinose at least in upper part; leaves alternate, short-petioled, ovate to ovate-rhombic, coarsely sinuate-toothed, entire and cuneate at base, obtuse and often minutely mucronulate, green above, whitish-farinose beneath, the uppermost reduced, narrower and entire; flowers verticillate in a leafy inflorescence; staminate 5-merous; pistillate in axillary glomerules of 5–10, with broadly ovate-triangular or broad-rhombic bracteoles; fruiting bracteoles short-stipitate, united in lower half, free and toothed above, prominently 3–5-nerved; seeds round, dark brown, glabrous, lustrous, ca. 2 mm in diameter. July–September. (Plate IV, Figure 3a–b).

Weed-infested places and chalky ground. — European part: U. V., V.-Dnp., V.-Don, M. Dnp., Transv., Bl., Crim., L. Don, L. V. (right bank). Gen. distr.: throughout W. Eur., As. Min. Described from S. Europe. Type in London.

Economic importance. The young shoots are used in W. Europe for pickling, like capers. The plant is employed in Greece as a source of potash. Applied in popular medicine for treatment of scrofula and scurvy (Rollov).

17. *A. sphaeromorpha* Iljin in Bull. Jard. Bot. Princ. l'URSS XXVI, 4 (1927) 414; Il'in in Fl. Yugo-Vost. IV, 162. — Ic.: Fl. Yugo-Vost. IV, fig. 261. — Exs.: HFR no. 3079.

95 Annual, 15–70 cm high, strongly divaricately branched, the shape of tumble-weed; stems and branches whitish, the terminal ones subcapillary, sparsely lepidote; leaves alternate, with very short petioles, ovate to oblong-ovate, remotely and coarsely toothed; inflorescence leafy, sparsely colored; flowers in axillary glomerules; pistillate bracteoles broad-rhombic, cuneate and connate at base, toothed and free at summit, often appendiculate, sessile, mostly 3 in glomerule; seeds round, 2–2.5 mm in diameter, flat, concave at center. July–September. (Plate IV, Figure 2a–b).

As a weed at the borders of fields, beside fences, on railroad embankments, in gullies, etc. — European part: Bl. (Aleksandrovka area), Askaniya-Nova, etc.; Transv. (S.), L. V.; Caucasus: Cisc.; Centr. Asia: Ar.-Casp. Endemic. Described from the vicinity of Lake El'ton. Type in Leningrad.

18. *A. tatarica* L. Sp. pl. (1753) 1053; Kryl., Fl. Zap. Sib. IV, 895; Il'in in Fl. Yugo-Vost. IV, 163. — *A. laciniata* L. Sp. pl. (1753) 1053 (p. p.); Fenzl in Ldb. Fl. Ross. III, 718; Shmal'g., Fl. II, 373. — ? *A. procumbens* Less. in Linnaea IX (1835) 203. — *A. Lehmanniana* Bge. Reliq. Lehman. (1851) 451 (in adnot.). — *A. astracana* Balb. Hort. Taurin (1813). — *A. rosea* var. *subintegra* C. A. M. in Ldb. Fl. Alt. IV (1833) 314; Kryl., Fl. Zap. Sib. IV, 896. — *A. incisa* M. B. Fl. taur.-cauc. III (1819) 641; Sosnovsk. ex Grossg., Geobot. och. Mugansk. st. (1929) 60. — *A. diffusa* Ten. Fl. Nap. I Prodr. S. LVII, 5 (1815). 295. — *Schizotheca laciniata* Fourr. Ann. Soc. Linn. Lyon. N. S. XVII (1869) 143. — *Sch. tatarica* Čelak. Prodr. Fl. Bohem. Nachtr. (1874) 1, non 149. — *Teutliopsis tatarica* Čelak. Oesterr. Bot. Zeitschr., XXII (1872) 169. — Ic.: Rchb. Ic. Fl. Germ. XXIV, tab. 269, f. 1—10; Gmel., Fl. Sib. III, tab. 14, f. 1; Syreishch., Fl. Mosk. gub. II, 92 (sub *A. lacinata*). — Exs.: Dörfler herb. norm. no. 5164; Baenitz. Herb. Europ. no. 2488; HFR no. 3080 et 3081 a, b.

Annual, 10—100 cm high; stem erect or ascending; branched; leaves alternate, petiolate, triangular-ovate to oblong-ovate, rarely narrower, sinuate-toothed or lobed, often hairy on the margin, minutely mucronulate or rarely acute and then 3-lobed and subentire with much elongated middle lobe, silvery-farinoso on both sides and then stem erect (var. *concolor* Fenzl. in Ldb. Fl. Ross. III (1851) 720), or decumbent (var. *diffusa* (Ten.) Gürke in Richter-Gürke, Pl. Eur. II (1897) 47 = *A. laciniata* β *diffusa* Moq. Chenop. (1840) 57), or stems virgate and slender with oblong-lanceolate to linear-lanceolate leaves (var. *virgata* Boiss. Fl. Or. IV (1879) 910), or silvery only on the underside (var. *discolor* (K. Koch) Graebn. in Asch. et Gr. Syn. V (1913) 146, *A. laciniata* β *discolor* K. Koch in Linnaea IX (1831) 183); flowers in terminal spiciform inflorescences, these leafless except in lower part; staminate flowers 5-merous; pistillate in glomerules of 3-20, enclosed by a pair of bracteoles; fruiting bracteoles united in lower half, rhombic-sagittate or often 3-lobed, prominently nerved, minutely stipitate, the terminal tooth larger, the 1—3 lateral teeth smaller; seeds round, 2.5—3 mm in diameter, lustrous, glabrous, brown. July—September.

Continental or coastal solonchaks (in the latter case often on *Zostera* refuse), also in weed-infested solonchak places. The first three forms, notably var. *virgata*, associated with more southerly arid areas, the fourth more northerly. Growing in masses. — European part: U. V., V. Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: Ob (Tobol'sk), U. Tob., Irt., Alt. (SW); Centr. Asia: throughout. Gen. distr.: Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran., Dzu.-Kash., Mong., Tib., Ind.-Him. Described from E. Europe: "in Tataria," possibly from the Volga steppes. Type in London.

Economic importance. Considered as good forage for camels and often covering extensive solonchak areas. Chemical analysis of flowering plants from Kazakhstan (Chelkar District) has given the following percentage composition: ash 22.42 to 24.37, cellulose 11.07 to 12.03, crude protein 10.89 to 11.84, crude fat 1.84—2, nitrogen-free extract 45.78 to 49.76. The starch equivalent, as established in two cases (I. Larin), amounted to 33.31 and 36.19. The plant may be used as a source of potash. Budding

plants from the Lower Volga region have yielded the following analysis in percentages of dry weight: water 21.53, ash 12.32, crude protein 8.07, albumin 6.99, crude fat 2.62, crude cellulose 24.17, nitrogen-free extract 32.29, digestion coefficient for crude protein 32.60, albumin 28.61, crude fat 41.11, crude cellulose 35.63, nitrogen-free extract 45.57; digestible substances as percentage of fresh weight: albumin 2.55, crude fat 1.08, cellulose 8.26, nitrogen-free extract 14.71, protein ratio 9.9; starch equivalent 13.98. The herbage corresponds in nutritive value to spring or oat straw of medium quality (Aleksandrovskii and Beguchev). The plant is of interest in its medicinal applications.

19. *A. pungens* Trautv. in Bull. Soc. Nat. Mosc. III (1867) 53. —
A. serpyllifolium Bge. in A. H. P. V, 2 (1878) 642.

Annual, 10—40 cm high, strongly divaricately branched from base, sometimes without a distinct main stem; stems and branches very slender, commonly geniculately curved at the tips, smooth and whitish; leaves narrow, linear to oblanceolate, narrowing toward base, terminating in a short caducous cusp, entire, densely whitish- to almost silvery-farinose on both sides, the margins always involute; glomerules at first crowded in capitate or capitate-cylindric inflorescences, these later elongating; staminate flowers 5-merous; pistillate bracteolate; bracteoles mostly ovate-triangular, with 2- or 3-toothed margins, united only at base, often taper-tipped; seeds brown, 1—1.5 mm in diameter. June—September.

Gypsiferous solonchaks, diatomaceous soils, and marls. Growing in small groups. — Centr. Asia: Ar.-Casp., Balkh. (W.). Endemic. Described from the Chu River area (Balkh.). Type in Leningrad.

20. *A. ornata* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, II (1936). 124.

Annual, 30—75 cm high, erect, much branched; stems and branches elongated and whitish; leaves alternate, short-petioled, oblong-ovate or hastate-ovate, entire or remotely few-toothed, obtuse to acute, minutely mucronulate, on both sides rather densely white-farinose; inflorescences spiciform, branched, borne on long branches forming a corymbiform panicle; fruiting bracteoles spreading, densely gray-farinose, hastate, borne on a short stoutish stipe, united only at base, with brownish lateral appendages, the elongate middle lobe entire or toothed below, the smaller lateral lobes 1—3-toothed; seeds 1—1.5 mm in diameter, either black and convex or light brown and flat. August—September. (Plate IV, Figure 18).

Solonetz soils, especially those covered with *Haloxylon aphyllum*. — Centr. Asia: Balkh. (S.), Kara K. (S.), Syr D. Endemic. Described from the area of the Muyunkum sands (Kos-kudukskaya saxaul woodland). Type in Leningrad.

21. *A. schugnanica* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, II (1936) 123.

Annual, 15—50 cm high, branched from the base; branches very long, equaling or exceeding the stem, ascending, whitish, glabrous or only in the inflorescence farinose, in the thicker places often with readily separating hyaline periderm; leaves alternate, petiolate, ovate or oval or mostly ovate-hastate to triangular-hastate, with spreading or scarcely upturned



PLATE V. 1. *Camphorosma annuum* Pall.: inflorescence.— 2. *C. monspeliacum* L.: flower.— 3. *C. lessingii* Litw.: flower.— 4. *Kirilowia eriantha* Bge.: a) fragment of inflorescence; b) flower.— 5. *Echinopsilon hirsutum* (L.) Moq.: fragment of inflorescence.— 6. *Kochia sieversiana* (Pall.) C.A.M.: same.— 7. *Echinopsilon divaricatum* Kar. et Kir.: same.— 8. *Kochia schrenkiana* (Moq.) Iljin: same.— 9. *Kochia scoparia* (L.) Schrad.: same.— 10. *Panderia turkestanica* Iljin: same.— 11. *Echinopsilon sedoides* (Pall.) Moq.: same.— 12. *Kochia iranica* (Bornm. et Hausskn.) Litw.: same.— 13. *Echinopsilon hyssopifolium* (Pall.) Moq.: same.— 14. *Lonsdesia eriantha* C.A.M.: same.— 15. *Kochia laniflora* (S.G. Gmel.) Borb.: same.— 16. *K. krylovii* Litw.: same.— 17. *K. melanoptera* Bge.: same.

basal lobes, entire or more rarely sparingly toothed, broadly cuneate or rounded toward the petiole, obtuse at apex and often obsoletely mucronulate, thin, green above, paler beneath with slight mealiness; peduncles axillary, arising from the stem base, solitary or several together, long, capillary, leafless or sparingly leafy; flowers in remote glomerules, forming always interrupted spiciform inflorescences; staminate 5-merous; pistillate enclosed by a pair of bracteoles, these rhombic or oblong-ovate, entire or toothed, united in lower part, farinose, obscurely nerved, short-stipitate, rarely to 2 mm in diameter; seeds small, ca. 1.5 mm in diameter.

98 August.

Stony and sandy-stony places. — Centr. Asia: Pam.-Al. (Pamir, Shugnan). Endemic. Described from Rushan, from the Bartang River valley and the Usoi natural boundary area. Type in Leningrad.

22. *A. pamirica* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. I, 2 (1936) 124. — *A. rosea* O. Fedtsch. in A. H. P. XXI, 3 (1903) 409 et XXIV, 2 (1905) 138, non L.

Annual, 5—25 cm high; stems whitish, simple or long-branched below; branches covered in upper part and especially in inflorescence with scarious hairs intermixed with some brown and blackish ones; leaves alternate except the lowermost, petiolate, ovate or oval, obtuse, entire or sparingly and obsoletely toothed, mostly rounded-attenuate toward the petiole, dull, paler beneath with rather dense mealiness; inflorescence spiciform, leafy except at the summit; staminate flowers 5-merous; pistillate bracteolate; bracteoles ovate-rhombic or ovate-hastate, connate in lower half, free above, prominently nerved, in the free part entire or sparingly toothed, covered with mostly tuberclelike colorless scarious hairs; seeds flat, 1—2 mm in diameter, light or dark brown. July—August. (Plate IV, Figure 9).

Barren solonetzic lakeshores and glacial hills. — Centr. Asia: Pam.-Al. (Pamir). Endemic. Described from the vicinity of Lake Kara-kul' in the Pamir. Type in Leningrad.

23. *A. cana* C. A. M. in Ldb. Fl. Alt. IV (1833) 311; Fenzl in Ldb. Fl. Ross. III, 731; Il'in in Fl. Yugo-Vost. IV, 154; Shmal'g., Fl. II, 374; Kryl., Fl. Zap. Sib. IV, 900. — *Halimus canus* Claus in Beitr. z. Pflanzenk. VIII (1851) 251. — Ic. — Ldb. Ic. pl. Fl. Ross. I (1829) t. 46; Act. Univ. As. Med. ser. VIII — in 21, fig. 19; Korovin, Rast. Sr. As., fig. 133. — Exs.: HFR no. 3071.

101 Undershrub, 20—50 cm high, strongly branched in lower part; annual shoots and leaves densely covered with silvery-white chaff; leaves alternate, the lower ones often subopposite, thickish, oblong-ovate to oblanceolate or the upper ones rarely linear, obtuse, often emarginate, narrowed to a petiole, entire; flowers in leafless verticillate-spiciform inflorescences forming a panicle; bracteoles of pistillate flowers sessile, broad at summit, mostly 3-toothed, united to the middle; seeds round, 2—2.5 mm in diameter, flat. July—September.

Soils transitional between solonchak and solonetz, also crustose solonetz. Growing in masses and representing one of the characteristic plants of semideserts. — European part: Crim. (needs verification), L. V.; Caucasus: E. Transc.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Dzu.-Kash. Described from Zaisan (first record) and from a location between the Irtys River and Lake Koryakovskoe. Type in Leningrad.

Economic importance. An excellent fuel in desert localities; burning well even in fresh condition. It is stored by the Kazaks in large quantities for winter use. According to I. Larin, it is inferior as fuel only to Haloxylon. Often covering extensive solonchak areas. Eaten by camels, but only in late fall. One hectare yields about 500–600 kg of herbage. Green shoots of Kazakhstan plants have the following percentage composition: ash 9.16 to 29.08, cellulose 12.79 to 18.15, crude protein 10.93 to 14.12, albumin from 7.26 to 8.12, amides ca. 0.12, crude fat 1.76 to 3.46, nitrogen-free extract 33.71 to 59; the starch equivalent computed for green parts of these plants fluctuates between 26.92 and 42.5% (I. Larin). Budding plants from the Lower Volga region yielded the following analysis in percentages of fresh weight: water 18.55, ash 11.16, crude protein 6.31, albumin 5.69, crude fat 1.42, crude cellulose 31.11, nitrogen-free extract 31.45; digestion coefficients were 46.44 for crude protein, 46.18 for albumin, 40.70 for crude fat, 42.11 for cellulose, 41.46 for nitrogen-free extract; digestibility figures in percentages of fresh weight were: albumin 2.31, crude fat 0.58, crude cellulose 13.10, nitrogen-free extract 13.14; protein ration 9.9; starch equivalent 13.98. Inferior in nutritive value to oat straw, approaching that of winter rye (Aleksandrovskaya and Beguchev).

24. *A. megalotheca* M. Pop. sp. nova in Addenda V, p. 661.

Annual, 30–50 cm high; stems erect or ascending, branched; branches often elongated and almost decumbent, the lower ones closely subopposite; leaves alternate, narrowing to a very short petiole, ovate, broad-ovate, or ovate-hastate, obtuse, broadly cuneate at base, entire, whitish-farinoso beneath and often partly above; flowers glomerate in the axils of both normal and reduced leaves; staminate 5-merous; pistillate in glomerules of 5–20, enclosed in fruit by a pair of bracteoles; fruiting bracteoles long-stipitate, large, mostly 10–45 mm long and 8–35 mm broad, commonly 3-lobed, farinose, with elongated entire obtuse middle lobe and 1 or 2 smaller lateral lobes, convex and indurated in the lower densely prickly-tubercled united part, herbaceous in the larger free upper part, the stipe to 50 mm long; seeds oval to rounded-oval, 2.5–3 mm long and 2–2.5 mm broad, light brown, smooth. June–July. (Plate IV, Figure 14).

Centr. Asia: Dzu.-Tarb. (Sary-Togoi). Gen. distr.: Dzu.-Kash. Described from Kashgaria. Type in Leningrad.

Section 4. *OBIONE* C. A. M. in Ldb. Fl. Alt. IV (1833) 315. — *Obione* sect. *Atriplicina* Moq. Chenop. (1840) 70. — Pistillate flowers without perianth, enclosed by a pair of bracteoles, these united for most of their length, becoming indurated; the small free part of the bracteole, sometimes reduced to small teeth, not readily detachable.

25. *A. centralasiatica* Iljin in Acta Inst. Bot. Ac. Sc. URSS ser. I, II (1936) 124.

Annual, 20–50 cm high, divaricately branched from base; stem whitish; leaves alternate, short-petioled, triangular, ovate-hastate, oblongly ovate-hastate, or ovate, truncate or broadly cuneate at base, entire or with few obsolete and blunt teeth, obtuse, often minutely mucronulate, the upper

ones narrow and acute, all whitish-farinose beneath, dull greenish above; flowers glomerate in the axils of nearly all leaves as well as at the ends of branches, in a short interrupted small-leaved inflorescence; staminate 5-merous; pistillate in glomerules of 3-15, bracteolate; fruiting bracteoles stipitate, united in lower part, free above, rhombic to subrotund, sometimes slightly 3-lobed, the stalk up to 15 mm long but mostly shorter; the bracteoles commonly occurring on the same plant in two forms, some subspherically convex and densely covered with aculeiform outgrowths, mostly rounded or subcordate at base, herbaceous and toothed at the summit, others flat, smooth, cuneate at base; seeds round or oval, 2-3 mm long, compressed, light brown, smooth. July-August. (Plate IV, Figure 15).

Gardens, outcrops of red clay, and stony deserts. — Centr. Asia: Balkh., T. Sh. Gen. distr.: Dzu. -Kash., Mong., Tib., China. Described from the Akchie natural boundary area in the SE Balkhash area. Type in Leningrad.

- 103 26. *A. sibirica* L. Sp. pl. ed. 2 (1763) 1493; Kryl., Fl. Zap. Sib. IV, 901. — *A. lucida* Moench, Meth. Suppl. (1802) 121. — *Obione sibirica* Fisch. Cat. Hort. Gorenk. (1808) 25; Turcz., Fl. baic.-dah. II, 2, 26. — *O. muricata* Gaertn. De fruct. II (1795) 198; Fenzl in Ldb. Fl. Ross. III, 734. — Ic.: Gaertn., l. c., tab. 126, f. 5; Gmel., Fl. Sib. III, 85, tab. 15, f. 2 (sub *Spinacia foliis triangularibus* etc.). — Exs.: HFR no. 3078.

Annual, 15-60 cm high; stem mostly erect, divaricately branched, rarely simple; leaves alternate, short-petioled, triangular-ovate or broadly triangular, broadly cuneate at base, obtusish, repand-dentate or more rarely subentire, whitish-farinose beneath; glomerules in the axils of leaves and in short interrupted spiciform almost leafless inflorescences; staminate flowers 5-merous; pistillate often up to 20-merous in glomerules, bracteolate; bracteoles short-stipitate, ovate to subrotund, strongly convex to globular, united nearly throughout, toothed at the summit, farinose, prominently netted-nerved and densely covered with aculeiform outgrowths; seeds round, 1.5-2 mm in diameter, smooth, lustrous, either blackish-brown and more convex or light brown and more compressed. July-August. (Plate IV, Figure 12).

Solonchaks, solonchak meadow, and solonetzic steppes. — W. Siberia: Irt. (R.), Alt.; E. Siberia: Ang. - Say.; Centr. Asia: Balkh. (?), T. Sh. (Issyk-kul'). Gen. distr.: Dzu. -Kash., Mong., Jap. -Ch. (Manchuria, Kansu). Described from Siberia. Type in London.

27. *A. turcomanica* Fisch. et Mey. in Bull. Soc. Nat. Mosc. XII (1839) 169 (nomen); Boiss., Fl. Or. IV (1879) 911; Bge. in A. H. P. VI, 2 (1880) 409. — *Obione turcomanica* Bge. Reliq. Lehm. (1851) 451 (nomen). — ? *A. leptoclada* Boiss. et Noë in Boiss. Diagn. pl. or. sér. II, 4 (1859) 74. — *A. laciniata* β *concolor* Lus. 2 Fenzl in Ldb. Fl. Ross. III (1851) 720. — *A. laciniata* ϵ *turcomanica* Moq. in DC. Prodr. XII, 2 (1849) 93. — *A. belangeri* Grossh. et Schischk., Sched. ad herb. "Pl. or exsicc." IX-XVI (1928) 41 (non Moq.). — Exs.: Pl. or. exs. no. 358.

Undershrub, 40-75 cm high, divaricately branched, the branches whitish; leaves rather small, oblong-ovate to oblong-subhastate, very short-stalked or sessile, slopingly and obtusely repand-toothed to subentire, mostly obtusish, densely whitish- or silvery-farinose on both sides, alternate; glomerules in the leaf axils and in interrupted leafless spiciform inflorescences; fruiting

bracteoles obovate or at base broadly cuneate, united except for the often rounded and toothed upper margin, in lower half strongly indurated, adnate to the stem and often united among each other, farinose, prominently nerved and covered with irregular outgrowths on two sides; seeds brown, ca. 1.25–1.75 mm in diameter, the embryo with radicle pointing upward.

04 Takys and river valleys. — Caucasus: E. and S. Transc.; Centr. Asia: Kara K., Mtn. Turkm., Amu D. Gen. distr.: As. Min., Iran. First described from Turkmenia, apparently from the vicinity of Krasnovodsk. Type in Leningrad.

Note. Until now this plant has been reported by all authorities as annual, due to the fact that samples had been collected without the lower part of the plant and, consequently, it was considered as a form of *A. tatarica* L. (*A. laciniata* L.). This is shown to be wrong by the evidence that it is an undershrub and by its connate bracteoles which distinguish it from *A. tatarica*.

28. *A. verrucifera* M. B. Fl. taur.-cauc. II (1808) 441; Kryl., Fl. Zap. Sib. IV, 902; Shmal'g., Fl. II, 374; Il'in in Fl. Yugo-Vost. IV, 153. — *Obione verrucifera* Moq. Chenop. (1840) 76; Fenzl in Ldb. Fl. Ross. III, 734. — *O. portulacoides* Fenzl in Ldb., l. c., 735, non Moq. — *Atriplex portulacoides* Pall. et auct. ross. non L. — *A. glauca* Pall. It. I (1771) 494. — Ic.: Ldb., Ic. pl. Fl. Ross., t. 144; Acta Univ. As. Med. ser. VIII—b, 21, fig. 17. — Exs.: HFR no. 3082a, b. — Kazak name: zhalman-kulak.

Undershrub, 15–50 cm high, branched chiefly in lower part, cinereous; leaves opposite except sometimes the uppermost 1–3, oval to oblong-ovate, obtuse, the uppermost sometimes acute, narrowed to a petiole, entire, vertically oriented; flowers in an interrupted fasciculate-spiciform inflorescence forming a panicle; pistillate bracteoles subsessile, short-attenuate toward base, subequally 3-toothed at apex, fleshy, verrucose, fully connate. July–September.

Wet solonchaks and saline solonchaks; thicket-forming. — European part: M. Dnp. (SE), Bl., Crim., L. Don (S.), L. V.; Caucasus: Cisc., Dag., S. and E. Transc.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar. -Casp., Balkh., Kyz. K., Kara K. (Krasnovodsk). Gen. distr.: Arm. -Kurd., Iran., Dzu. -Kash., Mong. Described from specimens collected in the Crimea and the Caucasus. Type in Leningrad.

Economic importance. Although the plant often occupies extensive areas on solonchaks and serves as feed for camels, it is of relatively little value and is eaten less readily than *A. cana*. Analysis of flowering plants from W. Kazakhstan gave the following percentage composition: ash 23.63 to 26.80, cellulose 14.12 to 16.18, crude protein 7.3 to 9.12, albumin 6.26 to 6.75, amides 0.11 to 0.12, crude fat 2.1 to 2.26, nitrogen-free extract 42.36 to 49.47; various determinations of starch equivalent yielded values fluctuating between 30.61 and 34.45 (I. Larin). Old specimens from the Lower Volga region analyzed as follows on a dry weight basis; ash 12.5, of which 43.25% water soluble salts; the ash included 7.1966 g K_2SO_4 , 4.8218 g Na_2SO_4 , 24.5577 g NaCl, 0.8116 g Na_2CO_3 , and 1.8928 g free sodium bicarbonate (Goebel). The plant is of interest for ornament.

105 29. *A. thunbergiaefolia* Boiss. Fl. Or. IV (1879) 911. — *Obione thunbergiaefolia* Boiss. et Noë in Boiss. Diagn. Ser. II, 4 (1859) 74. — *A. aralensis* Iljin in Herb. Inst. Bot. Acad. Sc. URSS.

Annual, 40–150 cm high; stem mostly erect, rarely simple, mostly branched, clearly 4-angled, reddish at the summit; leaves alternate except the lower ones, short-petioled, broadly triangular or subsagittate-triangular, with spreading basal lobes and sometimes (mostly the lower ones) with a pair of small retrorse subsidiary lobes, obtuse, very rarely entire, mostly coarsely and remotely sinuate-toothed, silvery-farinose on both sides or mainly beneath; glomerules in the leaf axils and in a rather large leafless paniculate inflorescence composed of spikes; pistillate glomerules many-flowered; pistillate bracteoles obovate to oblong-obovate, longitudinally nerved with transversal anastomoses, yellowish except for the green middle part, united except the crenate summit; bracteoles of axillary pistillate flowers extended into a rather long thickish hard smooth shaft; seeds small. (Plate IV, Figure 13 a–b).

"Tugai"* — Centr. Asia: Kyz. K. (delta of the Amu Darya). Gen. distr.: Iran. Described from the Tigris River valley near Kut. Type in Geneva; cotype in Leningrad.

Note. *A. belangeri* Moq. approaches this species very closely indeed, but, in the absence of the original specimens and in view of Moquin's tentative designation of this plant as suffrutescent, we are restrained from establishing identity of the two species.

30. *A. flabellum* Bge. in Boiss. Fl. Or. IV (1879) 912; A. H. P. VI, 2 (1880) 411. — *Obione Flabellum* Bge. in A. H. P., l. c. — Exs.: H. F. A. M. no. 231; Ed. Hort. Bot. Petrop. no. 34; Sintenis It. transcasp. -pers. no. 2183b.

Annual, 10–100 cm high; stem erect, branched, glabrous, whitish, lustrous; leaves all opposite or the upper ones alternate, short-petioled, only the uppermost sessile, the blade orbicular to oblong-ovate, subhastate, sinuate-dentate, obtuse to acute, cinereous beneath; flowers glomerate in spiciform inflorescences gathered in a loose panicle, each glomerule consisting of numerous staminate flowers and a single pistillate flower; fruiting bracteoles of the latter proliferating and adnate by their margins almost to the apex, rotund in outline, 1–2 cm in diameter, deeply notched at base, stalked, coarsely and deeply 7–11-toothed, prominently nerved, the radially spreading nerves terminating in teeth; seeds round or rounded-oval, 2.5–4.5 mm in diameter. April–June. (Plate IV, Figure 4).

Stony slopes; commonly as weed in cultivated and old fields; also on refuse dumps. — Centr. Asia: Balkh., Dzu. -Tarb., Kyz. K., Kara K., Mtn. Turkm., Amu D., Syr D., Pam.-Al. Gen. distr.: Iran., Dzu. -Kash. Described from Iran east of Meshed between Faz and Tabatkuh. Type in Leningrad.

Economic importance. According to I. A. Linchevskii, a forage plant, apparently for camels.

31. *A. moneta* Bge. in Boiss. Fl. Or. IV (1879) 912. — Exs.: Sint. It. transcasp. -pers. no. 344. — Ic.: Sorn rast. SSSR, II (1934), fig. 122.

Annual, 10–50 cm high, divaricately branched from the base, stems whitish; leaves alternate except for the lowermost 1–3 pairs, petiolate, orbicular to broad-ovate, rounded at base, obtuse, entire or slightly and sparsely toothed with slanting rounded teeth, grayish-green, glabrous; flowers glomerate in spikelike leafless inflorescences disposed in a loose panicle; perianth of staminate flowers 4-merous; fruiting bracteoles accrescent, united throughout, rotund, 1–1.75 cm in diameter, subentire, sessile or obsoletely stipitate,

* [Russian word meaning a bottomland complex with woods, bushes, and meadows in river valleys (Soviet Central Asia).]

umbonate, the indurated central protuberance prominently 3-nerved and with transversal nerves around the center, broadly winged; seeds round or rounded-oval, 2.5–4 mm in diameter, very finely rugulose. April–May. (Plate IV, Figure 5).

Sands, clayey slopes, and cultivated fields. — Centr. Asia: Kara K., Mtn. Turkm., Amu D., Syr D., Pam.-Al. Gen. distr.: Iran. Described from two locations in the Khurasan Province of Iran, the first of these designated as a locality between Rived and Sabzawar. Type in Leningrad.

Economic importance. According to I. A. Linchevskii, a forage plant, apparently for camels. Of interest for ornament.

Section 5. *HALIMUS* C. A. M. in Ldb. Fl. Alt. IV (1833) 316. — *Halimus* Wallr. Sched. crit. (1822) 117, gen. Pistillate flowers without perianth, enclosed by fully connate and more or less distinctly stipulate bracteoles.

32. *A. pedunculata* L. Amoen. Acad. IV (1759) 296; C. A. M. in Ldb. Fl. Alt. IV, 316; Il'in in Fl. Yugo-Vost. IV, 153; Shmal'g., Fl. II, 364; Kryl., Fl. Zap. Sib. IV, 903. — *Obione pedunculata* Moq. Chenop. (1840) 75; Fenzl in Ldb. Fl. Ross. III, 736. — *Halimus pedunculatus* Wallr. Sched. crit. (1822) 117. — *Diotis atriplicoides* M. B. Fl. taur.-cauc. II (1808) 397 (excl. syn. Pall. Ind. taur.). — *Ceratocarpus salinus* Pall. It. I (1771) 268, 270. — *C. maritimus* Pall. sec M. B., l. c. — Ic.: Maevsk., Fl. Sr. Ross., ed. 5, p. 525, fig. 181; Fl. Yugo-vost. IV, p. 154, fig. 258. — Exs.: Rchb., Fl. Germ. exs. no. 483; HFR no. 3076 a–c.

Annual, 10–50 cm high, cinereous, simple or branched; leaves alternate, oval to oblong-obovate, obtuse, entire, short-petioled, oriented edgewise; flowers glomerate in a verticillate-spiciform inflorescence; staminate 3–5-merous; pistillate bracteolate; bracteoles initially sessile, finally long-stipitate, united throughout, cuneate-cordate, resembling the silicles of shepherd's purse, with 2 obtuse lateral lobes and a very small apiculate middle lobe; seeds rounded-oval, ca. 3 mm long and 2–2.5 mm broad. June–September. (Plate IV, Figure 1).

Wet solonchaks and solonchak meadows; solitary or in small groups. — European part: M. Dnp. (E.), Transv. (S.), Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag.; W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Ar.-Casp., Kara K. (Kerki). Gen. distr.: Scand., Centr. Eur., Atl. Eur. Described from England. Type in London.

33. *A. fera* (L.) Bge. in Mém. Acad. Sc. Pétersb. VII sér., XXVII, 8 (1880) 6. — *Spinacia fera* L. Sp. pl. ed. 2 (1763) 1456. — *S. divaricata* Turcz. ex Moq. in DC. Prodr. XIII, 2 (1849) 118. — *Obione fera* Moq. in DC. Prodr. XIII, 2 (1849) 107; Fenzl in Ldb. Fl. Ross. III, 733; Turcz. Fl. baic.-dah. II, 2, 26. — *O. lenticularis*, Moq. Chenop. (1840) 70. — *Atriplex lenticularis* C. A. M. in Turcz. cat. baic.-dah. no. 958 (1838) 15. — Ic.: Gmel., Fl. Sib. III, p. 86, t. 16.

Annual, 15–50 cm high; stem erect or ascending, simple or branched; leaves in lower part of the plant opposite, in upper part alternate, oblong-ovate to ovate-lanceolate, obtuse, entire, rounded-cuneate at base, more rarely subhastate, narrowed to a petiole, green on both sides, the upper ones narrower and covered, like the inflorescence, with a subsequently

exfoliating farinaceous film; flowers glomerate in the leaf axils and in a terminal spiciform inflorescence interrupted in fruit; staminate 4-merous; pistillate mostly in glomerules of 3-10, rarely solitary, bracteolate; bracteoles ovate, oval, or oblong-oval, distinctly stipitate in fruit, convex, united throughout, entire or at summit with 3 small teeth (of these the middle one acute, the lateral ones obtuse) or rarely 1-toothed, reticulate-nerved, in upper part sometimes muricate, mealy-scruffy; seeds round, flat, brown, smooth, 1.5-2 mm in diameter, with prominent radicle. July-August. (Plate IV, Figure 11).

Solonetzes. — E. Siberia: Ang. -Say., Dau. Gen. distr.: Mong. Described from Siberia, from the vicinity of Krasnoyarsk, according to Gmelin's collection. Type in London.

108 Genus 404. **EUROTIA*** ADANS.

Adans. Fam. II (1763) 269.

Annual plants; flowers unisexual; staminate with 4-merous perianth, with 4 short-filamented stamens, in short compact spikelike inflorescences terminating the branchlets, ebracteolate; pistillate without perianth, enclosed by a pair of bracteoles united to above the middle, borne in the leaf axils below the staminate inflorescence; pistil with 2 filiform styles; fruit vertical. Undershrubs or shrubs with alternate entire leaves, the leaves and annottinous shoots covered with stellate hairs. The genus contains 7 species.

1. Leaves narrowed or rounded toward base; low shrub, branched mainly in lower part 1. *E. ceratoides* (L.) C. A. M.
- + Leaves clearly cordate; undershrub branched mainly in upper part 2. *E. ewersmanniana* Stschegl.

1. *E. ceratoides* (L.) C. A. M. in Ldb. Fl. Alt. IV (1833) 239; Ldb., Fl. Ross. III, 738; Turcz., Fl. baic. -dah. II, 2, 30; Shmal'g., Fl. II, 375; Kryl., Fl. Zap. Sib. IV, 903; Il'in in Fl. Yugo-Vost. IV, 164. — *Axyris ceratoides* L. Sp. pl. (1753) 979. — *Krascheninnikovia ceratoides* Gleditsch. Nov. Comm. Acad. Petrop. XVI (1772) 548, 555. — *Diotis ceratoides* Willd. Sp. pl. IV (1805) 368. — *Ceratospermum papposum* Pers. Syn. II (1807) 551. — *Diotis ferruginea* Nees, Gen. Fl. Germ. Mon. IV (1835) 65. — *Eurotia ferruginea* Moq. in DC. Prodr. XIII, 2 (1849) 120. — *E. ceratoides* var. *ferruginea* Boiss. Fl. Or. IV (1879) 1918. — Ic.: Fl. Yugo-Vost. IV, fig. 262. — Exs.: HFR no. 3083 a-c.

Undershrub or small shrub, 40-100 cm high; leaves oval, oblong, ovate-lanceolate, or linear-lanceolate, with a very short petiole, obtuse to subacute, narrowed or rounded at base, entire, with slightly revolute margins, 1-nerved; segments of staminate perianth rounded -ovate, obtusish, stellate-hairy; fruiting bracteoles united, covered on the free spreading tips with stellate hairs, elsewhere with long simple white or finally rufescent hairs; these surpassing the tips; ovary hairy; fruit obovoid, ca. 3 mm long, covered with simple appressed hairs and scattered stellate ones. July-September. (Plate II, Figure 12).

* From Greek *euros*, mold, alluding to leaf color.

Steppes, mostly stony, gravelly, or desert steppes, and chalk. — European part: Bl., Crim., V.-Don, L. Don, Transv., L. V.; Caucasus: throughout except the forest and alpine zones of mountains; W. Siberia: U. Tob. (S. part), Irt., Alt.; E. Siberia: Ang.-Say. (steppe islands), Dau.; Centr. Asia: all regions. Gen. distr.: W. Med. (Spain and N. Afr.), Centr. Eur. (Hungary), Arm.-Kurd., Iran., Dzu.-Kash., Mong., Jap. -Ch. (N. China): Described from the Tatar ASSR and Moravia. Type in London.

Note. A. Lozina-Lozinskaya, in her review of this genus (Izv. Akad. Nauk SSSR, 1930, 977), divides *E. ceratoides* into three geographic races: var. *pratensis* A. Los. (pro f.), a steppe type with relatively tall erect stems, leaves almost glabrous above, and considerably developed pistillate inflorescences; var. *deserticola* A. Los. (pro f.), a mountain-desert type of lower stature, with usually prostrate branches, leaves similarly hairy on both sides, and less developed inflorescence; var. *tragacanthoides* A. Los. (pro f.), a depressed, tragacanthoid type forming compact cushions in the subalpine and alpine areas of Central Asia. These races include forms with ovate leaves (*f. latifolia* Moq. in DC. Prodr. XIII, 2 (1849) 120), lanceolate (*f. angustifolia* Fenzl in Ldb. Fl. Ross. III (1851) 738), and linear (*f. tenuifolia* Moq., l. c.).

Economic importance. Gathered for fuel in desert regions. It also serves there as feed for camels. Its economic importance is particularly great under conditions of high-mountain deserts of the Pamir. Analysis of the herbage from the Kazakhstan area gave the following percentage composition: ash 7.41—8.22, cellulose 20.86—23.14, crude protein 14.02—15.56, crude fat 2.6—2.89, nitrogen-free extract 45.24—50.19. The starch equivalent proved to be at values between 34.51 and 38.29 (I. Larin). An analysis of plants from the [former] Talas-Susamyr District of the Kirghiz ASSR yielded the following percentages: hygroscopic water 8.41, ash 10.68, cellulose 29.12, crude protein 12.36, crude fat 1.97, nitrogen-free extract 37.47 (Abolin and Sovetkina). Of interest for ornament.

2. *E. ewersmanniana* Stschegl. in Borshch. Geogr. Ar.-Kasp. kr. Pril. k "Zap. Im. Akad. Nauk," VII (1865) 46, 145; A. Los. in Bull. d. l'Acad. d. Sc. d. l'URSS, XXIX, 5—6 (1930) 993. — Ic.: A. Los., l. c., f. 1a, 2b, 3b.

Low shrub, to 100 cm high; branches in upper part densely ramified; leaves oval to oblong-ovate, short-petioled, cordate or rarely rounded at base, heavily hairy on both sides; fruiting bracteoles united, the united part 5—6 times longer than the free tips, the indument as in the preceding species. In other characters resembling the preceding.

Extensive sandy stretches of semidesert and northern desert regions. — Centr. Asia: Ar.-Casp., Balkh., Kyz K., Syr D., T. Sh., Dzu.-Tarb. Gen. distr.: Dzu.-Kash. Described from the E. Ural area. Type in Leningrad.

Genus 405. **CERATOCARPUS*** L.

L. Nov. pl. gen. (1747) 28; Gen. pl. ed. 5 (1754) 416.

Monoecious plants with unisexual flowers; staminate flowers ebracteolate, in groups of 2—5 in the axils of upper leaves, short-pedicelated,

* From Greek *ceras*, horn, and *carpos*, fruit, referring to fruit shape.

with a 2-lobed perianth and 1 stamen; pistillate flowers solitary, without perianth, with a hairy ovary and 2 long filiform stigmas, enclosed by 2 fully united obcuneate or obovate involucral bracteoles; fruiting bracteoles terminated by 2 long acute straight spreading aculeiform outgrowths. Stellate-hairy forking-branched annuals with narrow entire leaves. The genus contains 2 species.

1. Leaves narrowly linear, 0.5—2 mm broad; fruit obcuneate, with flat lateral faces 1. *C. arenarius* L.
- + At least the lower leaves lance-linear or oblong, 2—20 mm broad; fruit obovate, with convex faces 2. *C. turkestanicus* Szv.-Rycz.

1. *C. arenarius* L. Sp. pl. (1753) 969; Fenzl in Ldb. Fl. Ross. III, 739; Shmal'g., Fl. II, 375; Kryl., Fl. Zap. Sib. IV, 906; Il'in in Fl. Yugo-Vost. IV, 165. — Ic.: Fl. Yugo-Vost. IV, fig. 263; Maevskii, Fl. Sr. Ross., ed. 5, fig. 182. — Exs.: HFR no. 888.

Annual, 5—30 cm high, grayish by stellate hairs, strongly branched from base, the repeatedly and occasionally alternate forking branches often imparting to it a spherical tumble-weed shape; leaves alternate, opposite or even in whorls of 3 at the crotches, linear-filiform to linear, 1—4 cm long and 0.5—2 mm broad, narrowed toward base, strongly cuspidate, 1-nerved, covered with stellate hairs, long unbranched jointed hairs sometimes arising from the center of the stellate hairs; perianth of staminate flowers oblong-ovate, with obtuse lobes, sparsely covered with fugacious stellate hairs; ovary densely stellate-hairy; fruiting bracteoles united, oblong-obcuneate, 5—7 mm long and ca. 2.5—4 mm broad at summit, with a longitudinal nerve on each side and with straight spreading subulate outgrowths at the margins of the summit; fruits at the base of the stem resembling tomentose "cotyledons" with hornless involucels. May—July.

Sandy steppes, pastures, melon fields, plowland, and ruderal places in the forest-steppe, steppe, and semidesert belts. — European part: M. Dnp. (rare), Bl., Crim., V.-Don, L. Don, Transv., L. V.; Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Ar.-Casp., Balkh. Described from Tataria, apparently from the SE of the European USSR. Type in London.

Economic importance. Ebelek considers this plant to be of value as forage in semideserts and deserts, where it is eaten by livestock all the year round. It is of particular importance as fattening feed for horses and it improves the amount and quality of mare's milk. Percentage analysis of herbage from West Kazakhstan and the Volga region: ash 8.52—14.35, cellulose 18.8—37.16, crude protein 8.41—15.63, albumin 6.56—8.12, crude fat 1.38—2.36, nitrogen-free extract 28.41—59.13, soluble carbohydrates before inversion 1.17—11.61 and after inversion 2.2—8.23; starch equivalent fluctuates between 24.03 and 40.95 (I. Larin, Aleksandrova, Beguchev, and others). Two assays of June specimens from the Talas-Susamyr District of the Kirghiz ASSR gave the following percentage values: hygroscopic water 9.44 and 7.32, ash 7.53 and 9.86, cellulose 35.93 and 19.56, crude protein 7.62 and 9.06, crude fat 1.84 and 1.45, nitrogen-free extract 37.64 and 52.75, respectively (Abolin and Sovetkina).

2. *C. turkestanicus* Sav.-Rycz. in Addenda, V, p. 874 — *C. caput medusae* Bluk. in Festsch. z. Jubil. v. B. A. Keller (1931) 25 et 31. — *C. utriculosus* Bluk., l. c., 24 et 31; Kryl., Fl. Zap. Sib. IV, 905. — *C. arenarius* auct. turk. plur., non L. — Ic.: Bluk., l. c., p. 30 — Exs.: Sintenis It. transcasp.-pers. 1900-1901, no. 286.

Annual, 3-30 cm high, densely covered with almost spreading stellate hairs, one much elongated multicellular ray arising from the center of the stellate hairs; stem much branched from base, the plant often acquiring spherical shape; leaves linear to oblong, 2-7 cm long and 2-10 mm broad, narrowed toward base, in very broad leaves tapering to a distinct petiole, terminating in a rather firm cusp, stellate-hairy on both sides; fruiting bracteoles obovate to oblong-obovate, mostly 5-10 or rarely to 15 mm long (excluding cusp) and 4-7 mm broad, the upper ones often bearing at the upper angles straight spreading slenderly subulate spines often to 15 mm long; spines of lower younger bracteoles sometimes arched-recurved or very rarely reduced to small usually closed teeth; lowermost bracteoles at the base of the stem round white-tomentose and spineless. April-May. (Plate II, Figure 14).

Sands, loamy deserts, pebbles, conglomerates; as weed in cultivated fields. — Caucasus: Dag. (?), E. and S. Transc.; Centr. Asia: Ar.-Casp. (S.), Balkh., Kyz. K., Kara K., Syr D., Amu D. Gen. distr.: Arm.-Kurd., Iran., Dzu.-Kash. Described from the vicinity of Ashkhabad. Type in Leningrad.

12 Note. Bluket establishes a separate species, *C. utriculosus* Bluk., which is not geographically distinctive, as having recurved spiniform bracteole outgrowths. There are no grounds for this procedure, since in most *C. turkestanicus* Sav.-Rycz. plants this phenomenon may be observed as a function of age and characterizes young fruits in the lower part of the plant. Bluket disregards the name *C. turkestanicus* Sav.-Rycz., which has long penetrated into the literature and has become thoroughly established, for the reason that the description of this species has not been published. On the other hand, in describing his two species, *C. utriculosus* Bluk. and *C. caput medusae* Bluk., he does not supply a Latin diagnosis, and since the two species should be pooled on the lines proposed by V. M. Savich in establishing his species *C. turkestanicus*, I retain this older name.

Economic importance. Apparently the same as for the preceding species.

Genus 406. **AXYRIS***L.

L. Gen. pl. ed. 5 (1754), 420; Sp. pl. (1753) 979.

Monoecious plants with unisexual flowers; staminate flowers with 3-5-parted perianth and 2-5 stamens, glomerate, borne above the pistillate flowers, ebracteolate, the anthers unappendaged; pistillate flowers in the axils of upper leaves, with lateral bracteoles and a perianth of 3 segments; stigmas 2, filiform; fruit vertical; seeds containing endosperm and a horseshoe-shaped embryo, compressed laterally. Annual plants with green alternate leaves and stellate indument.

* From Greek a-, negative prefix, and ksiron, shears.

The genus contains 6 species.

1. Fruits of two sorts, the uppermost few, obovoid, the others very numerous, almost spherical 2.
- + Fruits uniform, never spherical, compressed laterally 3.
2. Pistillate flowers in compact glomerules. Siberia and Central Asia 4. *A. sphaerosperma* Fisch. et Mey.
- + Pistillate flowers in a more elongated inflorescence. Caucasus 5. *A. caucasica* (Somm. et Lev.) Lipsky.
3. Stem or its main branches prostrate; leaves broad-ovate to suborbicular; staminate flowers in capitate inflorescences; fruit broadly obovate or subrotund, with or without 2 obsolescent teeth at summit 3. *A. prostrata* L.
- + Stem erect; leaves lanceolate to oblong-ovate; staminate inflorescence spikelike 4.
4. Leaves acute or acuminate, mostly glabrous above; staminate inflorescences simple; fruit mostly 2.5–3 mm long, terminating in 2 approximate teeth 1. *A. amaranthoides* L.
- 113 + Leaves obtuse and hairy on both sides; staminate inflorescences branched in lower part; fruit 2–2.2 mm long, its apical teeth rather distant 2. *A. hybrida* L.

1. *A. amaranthoides* L. Sp. pl. (1753) 959; Fenzl in Ldb. Fl. Ross. III, 713; Turcz., Fl. baic.-dah. II, 2 (1856) 28; Shmal'g., Fl. II, 376; Kryl., Fl. Zap. Sib. IV, 907; Il'in in Fl. Yugo-Vost. IV, 167. — *Atriplex amaranthoides* Gmel. ex Moq. in DC. Prodr. XIII, 2 (1849) 116. — Ic.: Fl. Yugo-Vost. IV, fig. 264.

Annual, 15–80 cm high, stellate-hairy except for the glabrous upper surface of leaves, branched, the branches obliquely ascending; leaves short-petioled, ovate-lanceolate to narrowly lanceolate, narrowed to a petiole, acute or acuminate, entire, often with slightly revolute margins; inflorescence paniculate; staminate flowers in a spiciform inflorescence at the end of stem and branches, remotely glomerate in lower part; perianth segments mostly 3, oblong to oblong-oval, obtuse, stellate-hairy on the back; stamens 3; pistillate flowers in the axils of leaves below the staminate inflorescences, with hairy bracteoles; perianth segments 3, whitish-scarious, obovate, obtuse, covered with stellate hairs interspersed with longer simple hairs; fruit somewhat smaller than the accrescent perianth, obovate or oval, red or dark brown, compressed laterally, glabrous, 2.5–3 mm long, crowned by a 2-lobed winglike appendage one-fifth to one-fourth the length of the body, or sometimes the fruit unappendaged. July–September. (Plate II, Figure 11).

A weed in cultivated and old fields, refuse dumps, and ruderal places, also riverside bluffs and gravelly slopes. — European part: V.-Kama, Transv., V.-Don (only in the E., Ul'yanovsk Region); W. Siberia: Ob (south of 58°5'N. lat.), U. Tob., Irt., Alt.; E. Siberia: Yenisei (extreme S. — Eniseisk), Ang.-Say., Dau., Lena-Kol. (Yakutsk area); Far East: Ze.-Bu., Uda, Uss., Sakh., Kamch.; Centr. Asia: Dzu.-Tarb., T. Sh. Gen. distr.: Mong., Jap.-Ch., Tib., adventive in N. Am. (E.). Described from Dauria. Type in London.

Note. The plant is often responsible for massive infestation of cereal crops and it finds its way with the seed into the European part of the USSR. For this reason the species is often recorded on railroad embankments outside its distribution area.

2. *A. hybrida* L. Sp. pl. (1753) 980; Fenzl in Ldb. Fl. Ross. III, 725; Turcz., Fl. baic.-dah. II, 2 (1856) 28; Kryl., Fl. Zap. Sib. IV, 909. — Ic.: Gmel., Fl. Sib. III, t. 4, f. 1.

Annual, 10—30 cm high, erect, stellate-hairy, the branches obliquely ascending or sometimes almost spreading; leaves ovate to oblong-ovate, with relatively short petioles, entire, obtusish, stellate-hairy on both sides, on the average 1—3 cm long; staminate flowers in a short spiciform inflorescence at the ends of stem and branches; perianth segments 3, oblong or obovate, stellate-hairy; pistillate perianth 3-parted, hairy and stellate-pubescent; fruit rounded-oval to obovate, 2—2.2 mm long and 1.5—1.75 mm broad, strongly compressed laterally, concentrically wrinkled, dull, dark brown, terminating in 2 very short scarious distant teeth (one-eighth as long as the fruit) often with minute denticles between them. June—August.

Stony steppes and gravelly slopes, refuse dumps and ruderal places. — W. Siberia: Irt. (sporadically), Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Balkh. (Karakalinskies Mts. and Zaisan), Dzu.-Tarb., T. Sh. (E.), Pam.-Al. (Zeravshan). Gen. distr.: Dzu.-Kash., Mong. Described from Siberia. Type in London.

3. *A. prostrata* L. Sp. pl. (1753) 980; Fenzl in Ldb. Fl. Ross. III, 714; Turcz., Fl. baic.-dah. II, 2, 29; Kryl., Fl. Zap. Sib. IV, 909. — *A. pamirica* B. Fedtsch. in A. H. P. XXIV, 3 (1905) 342. — *A. prostrata* var. *pamirica* B. Fedtsch., l.c. — *A. glacialis* B. Fedtsch. in A. H. P. XXIV (1908) 57. — Ic.: Gmel. Fl. Sib. III, t. 4, f. 2.

Annual, stellately pubescent; stems and branches mostly reddish, 3—30 cm long, prostrate, ascending at the tips; leaves broad-ovate to suborbicular or obovate, 5—15 mm long, obtuse, narrowed to a petiole, stellate-pubescent on both sides, very rarely glabrous and then the stem and staminate flowers reddish (var. *viridis* Iljin); staminate flowers in a capitate inflorescence at the ends of stem and branches, with pubescent perianth; pistillate flowers 3-lobed, hairy; fruit broadly obovate or sometimes subrotund, 1.4—1.75 mm long and 1—1.5 mm broad, strongly compressed laterally, dark gray, dull, transversely rugose, terminating in obsolescent very remote white-scarious teeth or often without them. July—August.

Sands and pebbles of mountain rivers, stony slopes; often ascending above the timberline. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Pam.-Al. (Pamir). Gen. distr.: Mong. Described from Siberia. Type in Leningrad.

4. *A. sphaerosperma* Fisch. et Mey., Ind. Sem. Hort. Petrop. VI (1839) 46; Fenzl in Ldb. Fl. Ross. III, 910; Kryl., Fl. Zap. Sib. IV, 910.

Annual, 10—40 cm high, densely covered throughout with spreading stellate hairs; stem erect with obliquely ascending or more or less spreading branches; leaves oblong-ovate to ovate-lanceolate, acute or acuminate, narrowed to a short petiole, entire; staminate flowers crowded at the ends of stem and branches in capitate inflorescences, hairy; pistillate flowers on short branchlets in subcapitate inflorescences borne in the axils of larger leaves, with hairy 3-lobed perianth; fruits of two kinds, the terminal usually sparse, oblong-obovate, 1.3—2 mm long and 1—1.25 mm broad, slightly convex, with or without 2 small obtuse scarious teeth at the summit, the others more numerous, subspherical, 1.25—1.5 mm in diameter, scarcely compressed laterally, roughened longitudinally and in upper part obscurely transverse-rugose. (Plate II, Figure 10).

W. Siberia: Alt.; E. Siberia: Lena-Kol. (Belyurskaya village). Endemic. Described from the Chuya River in Altai. Type in Leningrad.

Note. Hardly anything is known concerning the habitat of this species. The specimen from Yakutia is labelled "a ridge beside a saline lake." Since the Altai specimens were collected at the Chuya River, it would appear that they are associated with desert-steppe conditions.

5. *A. caucasica* (Somm. et Lev.) Lipsky, Fl. Cauc. I (1899) 430. — *A. sphaerosperma* var. *caucasica* Somm. et Lev. in A. H. P. XVI (1900) 399. — *A. tectorum* Somm. et Lev. in Lipsky, l. c., 431. — Ic.: Somm. et Lev., l. c., t. XLII.

Annual, 5–30 cm high, densely covered throughout with spreading stellate hairs; stems erect or together with the divergent branches, prostrate; leaves oblong-ovate to broadly lanceolate, short-petioled, acute, entire; staminate flowers hairy, in capitate or short-spiciform inflorescences; pistillate flowers on short branchlets but not forming capitate glomerules, the mostly 3-lobed perianth hairy throughout; fruits of two sorts, in the upper parts of inflorescences oblong-obovate to obovate, with convex faces, often terminating in 2 very short scarious distant teeth, the others much more numerous, subspherical, 1.5–2 mm in diameter, but slightly compressed, laterally, toothless or with rudimentary teeth, finely striate longitudinally. July–August.

Stony places, along mountain paths at altitudes between 900 and 2,700 m, often close to glaciers. — Caucasus: Main Caucasus Range. Endemic. Described from specimens collected in two locations: Kuban in the Tiberda area, and Mount El'brus. Type in Florence.

Note. This species is so closely related to *A. sphaerosperma* Fisch. et Mey., that combining the two would be reasonably justified. The distinguishing characters indicated in the description of *A. caucasica* are not substantial; they include the gray as against reddish pubescence, heterocarpy, and uninterrupted hairiness of the female flowers. Closer
116 observations show that these characters apply to both species. However, the disjunct distribution area, ecological attributes, the occasional occurrence of spiciform staminate inflorescences, and less crowded pistillate flowers, all argue against full identification.

Tribe 6. CAMPHOROSMEAE Moq. Chenop. (1840) 82. Flowers perfect, often with some intermixture of unisexual ones, ebracteolate, 4- or more often 5-merous; perianth segments thin, scarious, mostly hairy, connate to varying extent; fruit with or without winglike or otherwise shaped outgrowths; stamens 4 or 5; anthers unappendaged; seeds horizontal or vertical, with annular or rarely almost horseshoe-shaped embryo. Hairy plants with narrow entire leaves.

Genus 407. **CAMPHOROSMA** *L.

L. Moen. acad. I (1747) 118; Gen. pl. ed. 5 (1754) 58.

Flowers perfect, 4-merous, ebracteolate, solitary in the axils of short bracteal leaves, forming rather compact spiciform inflorescences; perianth

* From the Greek words *camphora*, camphor, and *osme*, scent.

4-toothed, compressed, more or less hairy; stamens with exerted filaments and oblong-oval unappendaged anthers; ovary with style and 2 long filiform stigmas; fruit vertical; seed with endosperm and a hippocrepiform embryo. Annuals or undershrubs, hairy, with subulate or linear-filiform alternate leaves. The genus contains about 10 species.

1. Undershrubs 2.
- + Annual or biennial herbs 3.
2. Indument consisting of relatively short hairs; perianth with 4 lobes subequal; inflorescence rather slender, its branches ca. 2–4 mm in diameter; seeds ca. 1 mm in diameter.
- + Indument consisting of relatively long hairs; lateral lobes of the perianth longer and spreading; inflorescences stouter, their branches 4–10 mm in diameter; seeds 1.5–2 mm long . . 1. *C. monspeliacum* L.
3. Perianth glabrate, its spreading lateral teeth covered with short hairs or with but very few long ones, the distinct middle teeth green at summit; rather sparsely hairy or glabrous plants
- 117 + ... 3. *C. annuum* Pall.
- + Perianth often very hairy, its lateral teeth closed and covered with long bristlelike hairs, the middle lobes fully scarious; decidedly hairy plants 4. *C. songoricum* Bge.

1. *C. monspeliacum* L. Sp. pl. (1753) 112; Litvinov in Tr. Bot. Muz. Akad. Nauk II, 93; Il'in in Fl. Yugo-Vost. IV, 169; Kryl., Fl. Zap. Sib. IV, 911. — *C. perenne* Pall. III (1803) 66; Fenzl in Ldb. Fl. Ross. III, 742; Shmal'g., Fl. II, 363. — *C. monspeliacum* var. *typicum* Trautv. in Bull. Soc. Nat. Mosc. XL, 3 (1867) 57. — *C. ruthenicum* M. B. Fl. taur.-cauc. III (1819) 112. — Ic.: Pall., l. c., t. 57. — Exs.: HFR no. 1627.

Undershrub, 10–50 cm high, rather densely cespitose; annual shoots borne on the woody branches whitish or white-tomentose with short crisp hairs, mostly ramified only in upper part; leaves subulate, 3–10 mm long, stiffish, erect (*f. stricta* (Fenzl) Litw., l. c.) or more rarely recurved (*f. recurvifolia* (Fenzl) Litw., l. c.), covered with long somewhat spreading hairs, with reduced branchlets in their axils; flowers solitary in a short compact spike, the subtending bracteoles as long as or shorter than the flowers, sometimes spinescent (*f. spinescens* Litw., l. c.); perianth 3–3.5 mm long, densely covered with long hairs (var. *hirsutissimum* Litw., l. c.) or with short hairs and then glabrate beneath (var. *pilosum* Litw., l. c.) (the two longer lateral teeth herbaceous and recurved in fruit, mostly as long as the tube, the two middle lobes short and scarious; seeds oval or oblong-oval, 1.5–1.75 (2) mm long, brown or brownish-black, diffusely glandular. July–September (Plate V, Figure 2).

Solonetztes and solonetzic steppes, also gravelly solonetzic slopes; solitary or in groups. — European part: Bl., Crim., L. Don, L. V.; Caucasus:

Cisc., Dag., E. Transc. (rare); W. Siberia: U. Tob. (S.), Irt. (S.), Alt. ?; Centr. Asia: Ar.-Casp., Balkh. (N., rare). Gen. distr.: Med., Bal. -As. Min., Iran. (?)

118 Economic importance. The plant contains about 0.2% of volatile oil with the scent of bitter almonds which yields propylamine upon distillation with KOH (Wehmer). The plant emits the odor of camphor and in the past it had medicinal applications as a stimulant, diuretic, and diaphoretic. It still finds use in popular medicine in some localities (Rollov). The plant is considered in desert regions as forage for camels, sheep, and goats, but it is of rather poor quality. Chemical analysis gives the following percentage values: 1) for flowering plants, hygroscopic water 8.13, ash 14.31 to 15.58, cellulose 26.60-28.30, crude protein 10.74 to 11.69, crude fat 2.51-2.73, nitrogen-free extract 38.31 to 41.70, starch equivalent 28.90 to 31.46; 2) for fruiting plants, hygroscopic water 6.38, ash 15.68 to 16.75, cellulose 20.55 to 21.95, crude protein 7.97 to 8.51, crude fat 3.37 to 3.60, nitrogen-free extract 46.05 to 49.19, starch equivalent 83.46 to 85.07 (I. Larin).

2. *C. lessingii* Litw. in Trav. Mus. Bot. Acad. St. Pétersb. II (1905) 96; Kryl., Fl. Zap. Sib. IV, 912; Il'in in Fl. Yugo-Vost. IV, 170. — *C. ruthenicum* C. A. M. (non M. B.) in Ldb. Fl. Alt. I (1829) 151; Fenzl in Ldb. Fl. Ross. III, 743; Shmal'g., Fl. II, 363. — *C. monspeliacum* var. *ruthenicum* Trautv. in Bull. Soc. Nat. Mosc. XL, 3 (1867) 57. — Ic.: Fl. Yugo-Vost. IV, fig. 265.

Undershrub, 25-80 cm high, cespitose, the woody branches with clusters of leaves; annual shoots arising at the base of branches, ascending, simple or short-branched at the ends, whitish with short crisp tangled hairs; leaves subulate, 2-6 mm long, often heavily hairy, with clusters of reduced branchlets in the axils; flowers solitary in compact spiciform inflorescences, the subtending bracteoles the length of the flowers; perianth 2-2.5 mm long, rounded-oval, hairy, the 4 teeth subequal, straight, half as long as the tube; seed round, blackish-brown, flat, ca. 1 mm in diameter, diffusely glandular. July-September. (Plate V, Figure 3).

Solonchaks, chalk, stony slopes; sometimes in large groups. — European part: L. V.; Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: U. Tob. (S.), Irt. (S.), Alt. (W.); Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh., Pam.-Al., Syr D., Mtn. Turkm. Gen. distr.: Dzu.-Kash., Mong., Iran., Arm.-Kurd. Lessing's specimens from the vicinity of Gur'ev should probably be regarded as the type.

Economic importance. The uses are apparently like those of the preceding species. According to Larin, the plant is eaten by livestock more readily than the preceding. In Dagestan it is considered as good winter forage for sheep.

3. *C. annuum* Pall. It. III (1776) 603; Illustr. (1803) 67; Shmal'g., Fl. II, 362 (p. p.). — *C. ovata* W. et K. Pl. rar. Hung. (1802) 64; Fenzl in Ldb. Fl. Ross. III, 744. — Ic.: Pall. III., t. 58; W. et K., l. c., t. 63. — Exs.: Fl. exs. Austro-Hung. no. 2676.

Annual or rarely biennial, 5-30 cm high; stem erect or often ascending, mostly branched, glabrous or sparsely hairy, commonly reddish; lower branches ascending; leaves linear-filiform, semiterete, 0.5-1.5 cm long, diffusely hairy to glabrate; flowers in compact spiciform sometimes

clavately thickened inflorescences; perianth 3–4 mm long, glabrous in lower part, slightly hairy above, the longer lateral teeth herbaceous, obtusish, spreading, glabrous or short-hairy, the middle ones always herbaceous at summit, broader; seeds ca. 2 mm long. (Plate V, Figure 1). Solonchaks. — European part: Bl. Gen. distr.: Centr. Eur. (Hungary), Bal. (Serbia, Bulgaria, Rumania). Described from the vicinity of Kremenchug on the Dnieper River. Type in London.

Note. Bunge already pointed out (A. H. P. VI, 2, p. 415) that Pallas's Kremenchug specimens did not differ from the Hungarian. This species occurs infrequently in the Ukraine and is known from the vicinities of Kherson, Kremenchug, and several other places. Records from other locations should be referred to *C. songoricum* Bge.

4. *C. songoricum* Bge. in A. H. P. VI, 2 (1880) 415; Kryl., Fl. Zap. Sib. IV, 913. — *C. annua* Fenzl (non Pall.) in Ldb. Fl. Ross. III, 744 (p. p.); Shmal'g., Fl. II, 362 (p. p.); Kryl., Fl. Zap. Sib. IV, 912; Il'in in Fl. Yugo-Vost. IV, 171.

Annual or biennial?, 10–30 cm high, hairy; stem branched from base or rarely only in upper part; lower branches long, ascending, covered with long tangled hairs; leaves filiform-linear, 0.5–1.5 cm long and 0.5–1 mm in diameter, obtusish, covered with long straight spreading hairs and bearing reduced branchlets in the axils; flowers in a compact mostly somewhat claviform spike; perianth ovaloid, 3–3.5 mm long, hairy, the longer lateral lobes green, acutish, mostly approximate, one-third to one-half the length of the tube, with long hairs at summit, the shorter middle lobes obtusish, scarious; seeds oblong-ovovate, ca. 2 mm long and 0.75 mm broad, glabrous, brown, July–September.

Wet solonchaks, solonchak meadows, and meadow solonchaks. — European part: Bl., Crim., M. Dnp. (Lubny). L. Don, Transv., L. V.; Caucasus: Cisc.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Dzu.-Kash. Described from the vicinity of Kurchum on the left bank of the Irtys River. Type in Leningrad.

Economic importance. According to I. V. Larin, not eaten by livestock at all.

Genus 408. **PANDERIA***FISCH. et MEY.

Fisch. et Mey. Ind. sem. H. Petrop., II (1835) 46.

Flowers 5-merous, perfect, rarely intermixed with some pistillate ones, 1–7 in the axils of upper leaves, forming a spiciform inflorescence, ebracteolate; perianth hairy, tubercled on the back, in fruit winged; stamens 5, exserted; ovary with a short style and 2 long filiform hairy stigmas; fruit and seed vertical, glabrous; embryo tuberiform. Annual plants with alternate leaves. The genus contains 3 or 4 species.

1. Hairs on the stem very long, dense, all horizontally spreading; wings broad, rotund to ovate, their margins often contiguous 2. *P. turkestanica* Iljin.
- + Hairs loosely tangled; wings narrow, linear to lanceolate 1. *P. pilosa* Fisch. et Mey.

* Dedicated to Christian Pander (1749–1865).

1. *P. pilosa* Fisch. et Mey. Ind. sem. Horti Petrop. II (1835) 46. — (?)
 (?) *P. monticola* Boiss. ex Bge. Mem. Acad. Imp. Sc. St.-Petersb. VII sér.,
 XXXVII, 8 (1880) 9. — *Pterochlamys pilosa* Fisch. et Mey., in Ldb. Fl.
 Ross. III (1851) 741. — *Kochia noeana* Boiss. Fl. Or. IV (1879) 919. —
Panderia divaricata C. Koch in Linnaea XXII (1849) 186. — *Kiri-*
lowia pilosa Bge. Del. Sem. Hort. Dorpat (1843) 7. — Ic.: Engl. u. Prantl,
 Pflanzenfam. 2 Aufl., 16 c (1934) 52.7, f. 198 E—H.

Annual, branched, commonly with long branches from the base; stem and
 branches hairy, decumbent with long loosely tangled hairs interspersed with
 shorter ones; cauline leaves linear to linear-lanceolate or oblong, narrowed
 toward base; leaves on branches oblong to oval, sessile or obsoletely petiolate,
 all entire and hairy; perianth ovaloid-cylindric; perianth teeth one-fourth to
 one-third the length of the tube, with hoodlike appendages which turn into wings
 in fruit; wings narrow, corniculate or lanceolate, mostly hollow at base.

Ruderal solonchets sites; solitary. — Caucasus: Cisc.? (Kuba River area),
 S. and E. Transc., Tal. Gen. distr.: As. Min., Arm.-Kurd., Iran. (Iran).
 Described from Talysh. Type in Leningrad.

2. *P. turkestanica* Iljin in Bull. Jard. Bot. Acad. Sc. URSS, XXX, 3—4 (1932)
 364. — *P. pilosa* auct. turk., non Fisch. et Mey. — *Kirilowia pilosa*
 Bge. Del. sem. Horti Dorpat. (1843) 8.

123 Annual; stem mostly branched from base, densely covered with long
 horizontally spreading hairs; lower cauline leaves oblong to oblong-oval,
 short-attenuate at base; upper cauline and ramal leaves oblong-oval or
 ovate, sessile or nearly so, commonly rounded at base, all entire, hairy;
 perianth segment one-fourth to one-third as long as the tube, winged in fruit,
 the rotund or obovate wings mostly with crenate margin. (Plate V, Figure 10).

Haloxylon communities and takyr in sandy semidesert tracts; solitary
 or in small groups. — Caucasus: S. Transc. (adventive?); Centr. Asia: Ar.-
 Casp. (from the latitude of the Aral Sea and eastward), Balkh., T. Sh. Gen. distr.:
 Dzu.-Kash., Tib. ? Described from Chinese Dzungaria (between Manas
 and Shih-huo [Usu]). Type in Leningrad.

Genus 409. **KIRILOWIA*** BGE.

Bge. Del. Sem. Hort. Dorpat. (1843) 7.

Flowers perfect, sometimes with an intermixture of unisexual ones,
 ebracteolate, in spiciform inflorescences; perianth 5- or more rarely
 4-merous, scarious, hairy, not changing in fruit; stamens 5, strongly
 exserted, the anthers minutely appendiculate at summit; ovary with a short
 style and 2 hairy stigmas; seed vertical; embryo horseshoe-shaped.
 Annuals with alternate entire leaves. A monotypic genus.

1. *K. eriantha* Bge. Del. Sem. Hort. Dorpat. (1843) 7; Fenzl in Ldb. Fl.
 Ross. III, 742; Kryl., Fl. Zap. Sib. IV. 914. — Ic.: Engl. u. Prantl, Pflanzen-
 fam. 2 Aufl., 16 c (1934) 527, f. 198 J—N.

Annual, mostly branched, covered with short hairs and especially in
 upper part, with few longer ones; leaves oval to oblong-ovate, entire, sessile,
 short-attenuate, rather densely covered with subappressed hairs; flowers

* Named for I. Kirillov (1821—1842), Karelin's renowned associate.

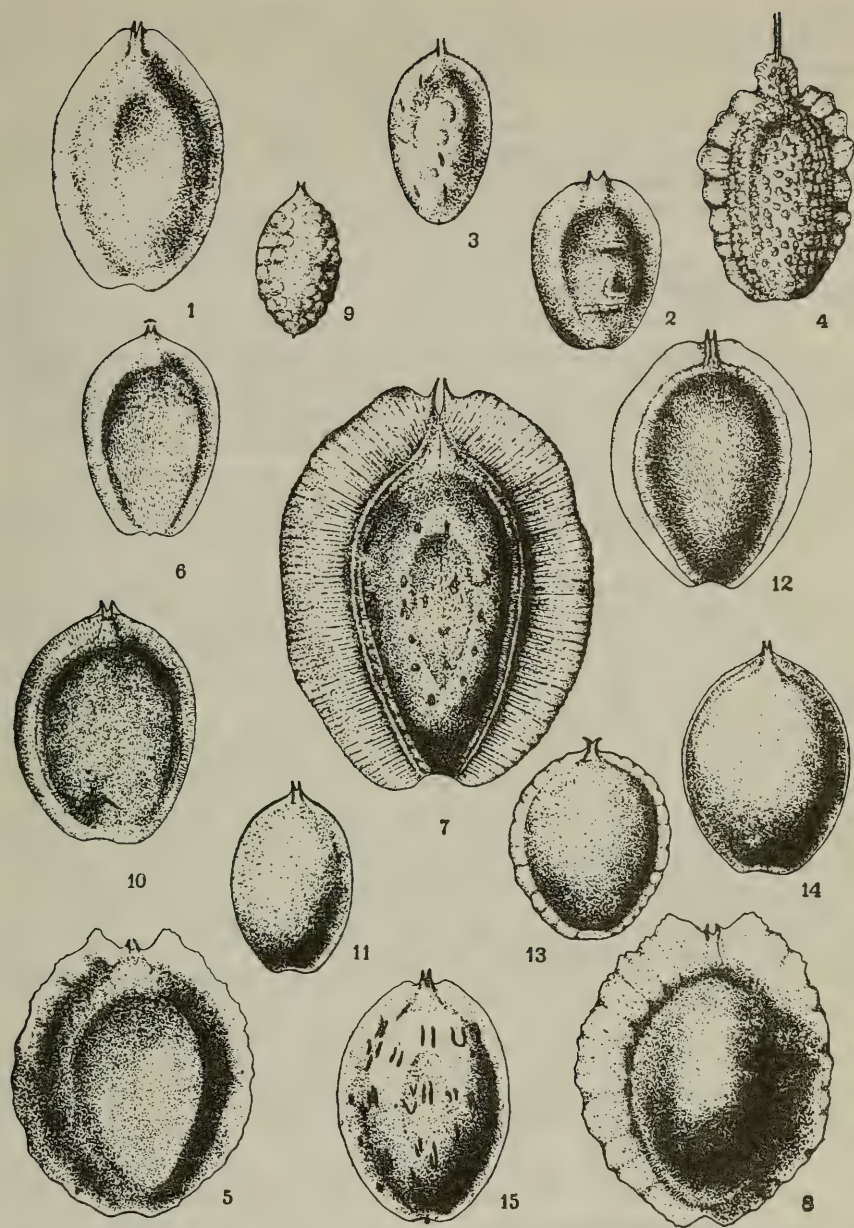


PLATE VI. 1. *Corispermum altaicum* Iljin.— 2. *C. erosum* Iljin.— 3. *C. pamiricum* Iljin.— 4. *C. dutreuilii* Iljin.— 5. *C. laxiflorum* Schrenk.— 6. *C. lehmannianum* Bge.— 7. *C. macrocarpum* Bge.— 8. *C. marschallii* Stev.— 9. *C. mongolicum* Iljin.— 10. *C. nitidum* Kit.— 11. *C. orientale* Lam.— 12. *C. sibiricum* Iljin.— 13. *C. squarrosus* L.— 14. *C. hyssopifolium* L.— 15. *C. elongatum* Bge.

solitary or in axillary glomerules, densely woolly-coated, the bracteal leaves spreading or slightly arched-recurved; perianth subcylindric,

solitary, perianth lobes broad, one-fifth to one-fourth the length of the tube, the basal hairs surpassing the perianth; seeds ovate to oblong-ovate, naked and smooth. (Plate V, Figure 4 a—b).

Solonetzic sands, clayey deserts, takyrs, resting places for cattle, and wasteland; solitary or in small groups. — Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kyz. K., Kara K., Syr D., T. Sh. Gen. distr.: Dzu.-Kash. Described from the vicinity of the Burgan River, in the Tarbagatai Range. Type in Leningrad.

124 Genus 410. **LONDESIA*** FISCH. et MEY.

Fisch. et Mey. Ind. Sem. Horti Petrop. II (1835) 40.

Flowers perfect, ebracteolate, with vertical ovary, in the axil of the bract and more numerous pistillate flowers with horizontal ovary in woolly glomerules, all forming a paniculate inflorescence; perianth scarious, mostly 5-lobed, long-hairy, firmly united in fruit with the pericarp; stamens 5, exserted; pistil with 2 or more rarely 3 long almost smooth stigmas; seeds in perfect flowers vertical, in pistillate ones horizontal. Plants with alternate entire leaves. A monotypic genus.

1. *L. eriantha* Fisch. et Mey. Ind. Sem. Horti Petrop. II (1835) 40; Fenzl in Ldb. Fl. Ross. III, 745. — *Kochia latifolia* auct. turkest., non Fresen. — *K. latifolia* var. *inermis* Boiss. Fl. Or. IV (1872) 927. — *Bassia latifolia* auct. turkest., non Volk. — *B. eriantha* N. Pavl. in Acta Univ. As. Med. Ser. VIII-b, 22 (1935) 28.

Annual; stem erect, bushy-branched from base, the stem and branches sparsely covered with soft hairs; leaves entire, acute, diffusely covered, especially beneath and on the margin, with long hairs; cauline leaves oblong to lanceolate, narrowing toward base; ramal and bracteal leaves ovate to oblong-ovate, mostly short-petioled; glomerules forming cottony balls, mostly in pairs on peduncles in the axils of bracts on each side of a perfect flower; perianth of perfect flowers with broad lobes one-fourth the length of the tube, that of pistillate flowers subtruncate, covered especially at base with very long hairs; fruit round or rounded-oval, hairy due to the adherent perianth. April—May. (Plate V, Figure 14).

Sands, stony slopes, takyrs, solonetzic clays, river valleys, etc.; solitary or in small groups. — Centr. Asia: Ar.-Casp. (sands of Sam and Kyya-kulduk west of the Sary-su River), Balkh., Kyz. K., Kara K., Mtn. Turkm. Gen. distr.: Dzu.-Kash. Described from the E. shore of the Caspian Sea. Type in Leningrad.

Genus 411. **ECHINOPSILON**** MOQ.

Moq. in Ann. Sc. nat. sér. 2, II (1834) 127. — *Bassia* All. (non L.) Misc. Taur. III (1766) 177.

Flowers 5-merous, ebracteolate; fruiting perianth with aculeiform or uncinat outgrowths; stamens mostly 5; stigmas 2, more rarely 3;

* Named for the German naturalist Friedrich Londe (1780 — 1807), who died in the Caucasus.

** From the Greek words *echinos*, hedgehog, and *psilon*, hair.

25 fruit mostly horizontal, rounded-ovate, flattened at the top; seeds with annular embryo and central perisperm. Annual plants with alternate leaves. The genus contains about 10 species.

1. Leaves flat, elliptic, oblanceolate, or linear; segments of fruiting perianth with incurved hooklike outgrowths 1. *E. hyssopifolium* (Pall.) Moq.
- + Leaves terete or semiterete, always linear; segments of fruiting perianth with tuberclelike or subulate outgrowths 2.
2. Stem and branches grayish, densely clothed with tangled crisp hairs 2. *E. sedoides* (Pall.) Moq.
- + Stem and branches with horizontally spreading hairs 3.
3. Fruiting perianth mostly with 3 short tuberclelike outgrowths; inflorescence axis helicoid at maturity 4. *E. hirsutum* (L.) Moq.
- + Fruiting perianth with 5 long subulate-tipped outgrowths; inflorescence strongly divaricately branched, with straight axis 3. *E. divaricatum* Kar. et Kir.

1. *E. hyssopifolium* (Pall.) Moq. Chenop. (1840) 87; Fenzl in Ldb. Fl. Ross. III, 751. — *E. lanatum* Moq. in Ann. Sc. nat. 2 sér., II (1834) 127. — *Bassia hyssopifolia* Volk in Nat. Pflanzenf. III, 1a (1892) 70; Kryl., Fl. Zap. Sib. IV, 919; Il'in in Fl. Yugo-Vost. IV, 172. — *Salsola hyssopifolia* Pall. It. I (1771) 491. — *Chenopodium lanuginosum* Mnch. Meth. (1794) 330. — *Willemetia lanata* Maerkl. in Schrad. Journ. III, 1 (1800) 330. — *Kochia hyssopifolia* Roth, Neue Beitr. (1802) 176; Shmal'g., Fl. II, 365. — *K. diffusa* Hort. Gorenki in Ldb., l. c. — *Suaeda hyssopifolia* Pall. Illustr. (1803) 44. — Ic.: Pall., l. c., t. 36 (sub *Suaeda*) Sorn. rast. SSSR, II (1934), fig. 125. — Exs.: Rchb. Fl. Germ. exs., no. 581.

Annual, 10–100 cm high; stems erect or ascending, simple or branched, covered especially at summit with crisp hairs; leaves mostly oblanceolate or oblanceolate-linear, acute or the lowermost sometimes obtusish, narrowed toward base, all flat, hairy on both sides or only beneath; flowers in glomerules of 2 or 3, forming a spiciform inflorescence; perianth hairy, subsequently sometimes glabrescent, in fruit with 5 uncinate incurved outgrowths; seed ovate or rounded-ovate, naked, 1–1.75 mm long. July–September. (Plate V, Figure 13).

Solonchaks, weed-infested places and refuse dumps; scattered or in groups. — European part: Bl., Crim., L. Don, L. V., Transv.; Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: U. Tob., Irt., Alt. (rare); Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D., Kara K., Amu D. Gen. distr.: W. Med., Centr. Eur., As. Min., Arm.-Kurd., Iran., Dzu.-Kash., Mong. Described from a location on the Ural River below Kalmykovskoe settlement. Type in London.

Note. A more southerly yellowish-green race, always with erect stem and less hairy, was described as *E. caspicus* A. Lehm. in Bge., Reliq. Lehm. (1851) 279 (= *Willemetia caspica* A. Lehm. in Bge., l. c. = *Kochia hyssopifolia* var. *caspica* Schrad.).

Economic importance. According to I. Larin, the plant is not eaten by any kind of livestock. According to Rollov it may be used as a source of soda.

2. *E. sedoides* (Pall.) Moq. in Ann. Sc. Nat. sér. 2, II (1834) 127; Fenzl in Ldb. Fl. Ross. III, 753. — *Bassia sedoides* Aschers. in Schweinf. Beitr. Aethiop. (1867) 187. — *Salsola sedoides* Pall. It. I (1771) 213. — *S. muricata* Pall. (non L.) Ind. Taur. (1796) 100; M. B. Tabl. Prov. Casp. (1798) 148. — *Suaeda sadifolia* Pall. Illust. (1803) 41. — *Kochia sedoides* Schrad. Neue Journ. III, 3, 4 (1809) 86; Shmal'g., Fl. II, 364. — *Willemtia sedoides* Moq. in Ann. Sc. Nat. 2 sér. I (1834) 210. — Ic.: Pall., l. c., t. 32–34 (sub *Suaeda sedifolia*). — Exs.: Fl. Hung. exs. no. 541; Fl. Austro-hung. no. 3851.

Annual, 10–60 cm high, grayish-hairy, mostly turning black in drying; stem branched, rarely simple, covered with densely tangled crisp hairs; leaves linear, fleshy, semiterete, sessile or scarcely narrowing at base; inflorescences spiciform; flowers mostly 2 or 3 together; perianth segments densely hairy, in fruit with 5 outgrowths, these straight or somewhat curved at the tips, varying in length, acute, enlarged at base; seeds naked, smooth, ovate, 2–2.5 mm long. August–October. (Plate V, Figure 11).

Solonchaks, solonetztes, solonetzic steppes, and pastures; scattered. — European part: M. Dnp., Bl., Crim., V.-Don, L. Don, L. V., Transv.; Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: U. Tob., Irt., Alt. (W.); Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb. Gen. distr.: Centr. Eur. (Hungary), Bal.-As. Min. (Bulgaria), Dzu.-Kash., Mong. (W.). Described from the vicinity of Kuibyshev. Type in London.

Economic importance. It has been reported for Kazakhstan (I. Larin) that in the semidesert region this plant is readily eaten by camels, sheep, and goats. According to Rollov, it may be used for extraction of soda. Old specimens from the Lower Volga region were found to have a mineral content of 9.6% on an air-dry basis; of this 60.75% water soluble salts, containing 7.7343 g K_2SO_4 , 3.4129 KCl, 12.0331 NaCl, 30.8419 Na_2CO_3 , free sodium bicarbonate 2.3416 (Goebel).

3. *E. divaricatum* Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 736; Fenzl in Ldb. Fl. Ross. III, 752. — *E. dasphyllum* Moq. in DC. Prodr. XIII, 2 (1849) 136. — *E. molle* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 754. — *Bassia divaricata* O. Kze. Rev. gen. (1891) 546; Minkw. Chenop. (1913) 344. — *B. divaricata* var. *mollis* Minkw. ex Iljin in Bull. Jard. Bot. Ac. Sc. d. l'URSS, XXX, 3–4 (1932) 364. — *Kochia dasphylla* Fisch. et Mey. in Schrenk, Enum. pl. I (1841) 12. — *K. divaricata* Bge. Enum. salsol. Mong. (1879) 355. — *K. mollis* Fisch. et Mey., l. c., p. 12. — *Chenolea divaricata* Hook. f. in Hook. Fl. Brit. Ind. V (1890) 10.

Annual, 8–50 cm high, strongly divaricately branched from base, greenish or white-tomentose; stem and branches covered with rather long spreading hairs; leaves semiterete or terete, obtusish, narrowing toward base, hairy; inflorescence widely spreading, its terminal branchlets very slender; flowers mostly solitary; perianth segments hairy, bearing in fruit subulate stellately expanded wide-based outgrowths, 0.5–2.5 mm long; seeds naked, smooth, almost round. August–September. (Plate V, Figure 7).

Sands, sandy steppes, stony slopes, pebbly riverbeds, and cultivated fields. — Centr. Asia: Balkh., Pam.-Al. (Pamir, Aksu, Karasu). Gen. distr.: Dzu.-Kash., Mong. Described from the shores of Lake Zaisan. Type in Leningrad.

4. *E. hirsutum* (L.) Moq. in Ann. Sc. nat. 2 sér., II (1834) 127; Fenzl in Ldb. Fl. Ross. III, 754. — *Bassia hirsuta* Asch. in Schweinf. Beitr. Fl. Aetiop. (1867) 187; Kryl., Fl. Zap. Sib. IV, 921; Il'in in Fl. Yugo-Vost. IV, 184. — *Chenopodium hirsutum* L. Sp. pl. (1753) 221. — *Salsola hirsuta* L. Sp. pl. ed. 2 (1762) 323. — *Suaeda albida* Pall. Illustr. (1803) 53. — *Schoberia pallasiana* C. A. M. in Ldb. Fl. Alt. I (1829) 402. — *Kochia hirsuta* Nolte, Novit. Fl. Holsat. (1826) 24; Shmal'g., Fl. II, 365. — *Villemetia hirsuta* Moq., l. c., I (1834) 210. — Ic.: Pall., l. c., t. 45 (sub *Suaeda albida*); Fl. Yugo-Vost. IV (1930) fig. 266. — Exs.: Rchb. Fl. Germ. no. 1266.

Annual, 10–40 cm high, branched from base; stem covered with spreading hairs, finally glabrate in lower part; leaves fleshy, semiterete, linear, sessile; inflorescence slender, helicoid in fruit; flowers solitary or in pairs; perianth hairy, segmented, in fruit with mostly 3 short dorsal outgrowths; seeds ovate, naked, smooth, 1.5–2 mm long. April–September. (Plate V, Figure 5).

Solonchaks, mostly coastal solonchaks. A rare plant, scattered or in small groups. — European part: Bl., L. Don, L. V.; Caucasus: Cisc., Dag., E. Transc.; W. Siberia: U. Tob., Irt., Alt. (Chuya, etc.); Centr. Asia: Ar.-Casp. (Emba). Gen. distr.: Scand. (Öland), Atl. Eur., Med., Bal. (Bulgaria and Rumania), Mong. Described from Montpellier. Type in London.

Economic importance. The plant is used in Cyprus for soda extraction.

Genus 412. **KOCHIA** * ROTH
Roth in Schrad. Journ. Bot. 1, 1800 (1801) 307.

Flowers ebracteolate, mostly perfect, 5-merous, with incurved perianth lobes; fruiting perianth with winglike outgrowths; stamens mostly 5; stigmas 2 or 3; seeds horizontal, mostly ovate, naked, smooth, with annular embryo and central endosperm. Annuals or undershrubs with alternate entire leaves.

1. Undershrubs 1. *K. prostrata* (L.) Schrad.
+ Annual plants 2.
2. Leaves linear-filiform, semiterete, obtusish 3.
+ Leaves oval to linear, clearly flat, acute or acuminate, more rarely obtusish 5.
3. Perianth mostly 3-winged; wings oblong, reddish, with blackish-purple confluent nerves; a glaucescent plant, turning dark 6. *K. melanoptera* Bge.
+ Perianth 5-winged 4.
4. Plants divaricately, heavily and densely branched; wings oblong, entire, obtuse, very slightly dilated toward base, all equal, in regular stellate arrangement 5. *K. krylovii* Litw.
+ Plant scarcely branched or with strongly developed mostly lower ascending branches, rather sparsely hairy; wings varying in shape from oblong to ovate, rhombic, etc., very slightly narrowed at base, the margin mostly unequally crenate 2. *K. laniflora* (S. G. Gmel.) Borb.
5. Leaves uniformly hairy on all sides, gray or grayish-green; perianth covered throughout with subappressed hairs 6.

* Dedicated to the German botanist Wilhelm Koch (1771–1849).

- + Leaves mostly green, glabrous or nearly so, the margin, especially that of bracteal leaves, long-ciliate; perianth glabrous, with bristle-like hairs usually confined to the margin 7.
- 6. Fruiting wings broad, subrotund to oval, scarious, the nerves uniformly developed. Solonchak soils 3. *K. iranica* (Bornm. et Hausskn.) Litw.
- + Fruiting wings narrow, oblong to sublinear, distant, often deeply and unequally sinuate-erose, the midnerve often strongly produced into a bristle. Sands. 4. *K. schrenkiana* (Moq.) Iljin.
- 7. Flowers in the leaf axils surrounded by tufts of long hairs 8. *K. sieversiana* (Pall.) C. A. M.
- + Flowers without such tufts of hairs 7. *K. scoparia* (L.) Schrad.

Section 1. **PTEROCARPUS** Beck. in Rchb. Ic. Fl. Germ. XXIV (1908)
151. — The dorsal appendages of perianth lobes distinctly winglike.

129 1. *K. prostrata* (L.) Schrad. Neues Journ. III (1809) 85; Turcz., Fl. baic.-dah. II, 34; Fenzl in Ldb. Fl. Ross. III, 747; Shmal'g., Fl. II, 363; Il'in in Fl. Yugo-Vost. IV, 175; Kryl., Fl. Zap. Sib. IV, 915. — *Salsola prostrata* L. Sp. pl. (1753) 222. — *Kochia suffruticulosa* Lessing in Linnaea IX (1834) 202. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 267, fig. 1–6; Hegi III. Fl. Mitt. Eur. III (1909) t. 249; Pall. Illustr. (1803) t. X (sub *Salsola*). — Exs.: Fl. Hung. exs. no. 543; Fl. Austro-Hung. no. 3850; Sintenis iter transcasp.-pers. no. 1025, 855, 1115. — Russian names: izen', prutnyak.

Undershrub, 10–75 cm high; branches ascending, covered with short crisp hairs and sometimes also with long woolly ones; leaves linear to filiform, flat, hairy; inflorescence spiciform or paniculate; glomerules remote, mostly in groups of 3 or rarely 4; perianth hairy, dorsal appendages of fruiting perianth either red, rounded, flat and tuberclelike, or oblong, winglike, narrowing toward base, scarious, rounded-toothed on the margin, with darker nerves; seed rounded-oval to subrotund, ca. 2 mm in diameter, with a prominent annular embryo, convex at center on both sides, brown, naked and smooth. July–September.

Solonetztes, solonetzic steppes, stony slopes, chalk, sandy steppes, and sandy plains. Common on sands, but scattered over large areas. — European part: U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., S. and E. Transc.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Ar.-Casp., Balkh., Mtn. Turkm., Dzu.-Tarb., T. Sh., Pam.-Al. Gen. distr.: Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran., Him., Dzu.-Kash., Mong., Tib., Manchuria. Described from N. Asia. Type in London.

Economic importance. The plant is used for fuel by nomads in semi-desert and desert regions. Horses and camels show a great liking for it. Kazaks esteem it as fattening feed for sheep, goats, and camels, but the plant is of little value for milk production. Analyses (I. Larin) of fruiting plants from West Kazakhstan showed the following percentage composition: 1) hygroscopic water 8.54, ash 13.83–12.61 [?], cellulose 29.24–31.97, crude protein 8.83–9.65, albumin 4.41–4.72, crude fat 2.05–2.24, nitrogen-free extract 38.71–42.33, soluble carbohydrates before inversion 2.43–2.66, after

inversion 3.07–3.36, starch equivalent 28.12–30.63; 2) hygroscopic water 5.63, ash 26.83–28.43, cellulose 14.25–15.10, crude protein 9.31–9.87, albumin 7.26–7.50, crude fat 1.85–1.96, nitrogen-free extract 42.13–44.64, starch equivalent 30.45–32.17. June specimens from the Talas-Susamyr District of the Kirghiz ASSR (Abolin and Sovetkina) had the following percentage composition: hygroscopic water 7.08, ash 19.63, cellulose 21.87, crude protein 9.07, crude fat 1.95, nitrogen-free extract 40.40. A more detailed analysis (Aleksandrovskii and Begichev) of flowering plants from the Lower Volga region yielded in percentages: water 21.16, ash 10.03, crude protein 7.73, albumin 7.06, crude fat 2.41, crude cellulose 27.76, nitrogen-free extract 30.91; the coefficients of digestibility were 41.22, 46.74, 43.31, 37.70, and 37.72, for crude protein, albumin, crude fat, crude cellulose and nitrogen-free extract, respectively. These coefficients computed as percentage of fresh weight were 2.51, 1.04, 10.46, and 11.66, for albumin, crude fat, crude cellulose, and nitrogen-free extract, respectively; on this basis the protein ratio was 9.7 and starch equivalent 10.37. It should be taken into account in this connection that, at pro capita daily rate, in this case 1,000 g per head of livestock, consumption averaged 350 g, while the uneaten fraction contained, beside coarse parts, also green matter indistinguishable from that of the consumed fraction. This would account for the authors' assessment of *Kochia prostrata* Schrad. as poor forage, little superior in value to winter rye straw. Contradictory estimates of the feed value of this plant are to be accounted for, above all, by the marked polymorphism of the species which includes various geographic races and ecotypes, the selective approach by different kinds of livestock, and, within the same kind, varying degree of habituation to this forage of animals from different regions. More thorough studies of this problem are needed. According to Rollov, the plant may be used for extraction of soda. The ash content of old plants from the Lower Volga region was found to be 11.7%, of this water-soluble salts amounting to 13.5% with the following composition: K_2SO_4 4.1154 g, KCl 2.1863, NaCl 2.0413, Na_2CO_3 1.3525, free sodium bicarbonate 0.6894 (Goebel).

Note. An exceptionally polymorphic species, in need of detailed critical treatment. Various geographic races can be distinguished throughout the distribution area of this species; they are often associated with characteristic soil properties. Particularly distinctive is var. *villosissima* Bong. et Mey. Verz. gesamm. Pflanz. (1841) 67 (= var. *lanuginosa* Bge.), a white-villous race associated with sands and sandy habitats of the semi-desert zone. Diametrically different is var. *virescens* Fenzl in Ldb. Fl. Ross. III (1851) 748, mainly associated with solonchik habitats, with almost glabrous leaves. A mountain race, also to be found on sandy loam soils, var. *canescens* Moq., has dense appressed pubescence. *K. tianschanica* Pavl. in herb., which occurs in Tien Shan and the Pamir-Alai Mountains, is also one of the races of this highly diversified cycle.

2. *K. laniflora* (S. G. Gmel.) Borb. Balaton fl. (1900) 340. — *K. arenaria* Roth in Schrad. Journ. II (1800) 1; Fenzl in Ldb. Fl. Ross. III, 749; Turcz., Fl. baic.-dah. II, 34; Shmal'g., Fl. II, 364; Kryl., Fl. Zap. Sib. IV, 916, II'in in Fl. Yugo-Vost. IV, 176. — *Chenopodium arenarium* Gärtn., Mey et Schreb. Fl. Wett. I (1791) 365. — *Salsola dasyantha* Pall. Illustr. (1803) 19. — *S. arenaria* Maerkl. Schrift. B. G. Regensb. I (1792) 332. — *S. tenuifolia*

M. B. Fl. taur.-cauc. I (18(8) 188. — *Willemetia arenaria* Maerkl. in Schrad. Journal. II, 2 (1801) 330. — *Kochia dasyantha* Schrad. Neu. Journ. III 3, 4 (1809) 86. — *K. tenuiflora* M. B. Fl. taur.-cauc. I (1808) 188. — *Salsola laniflora* S. G. Gmel. Reise durch Russl. I (1774) 160. — Ic.: Pall., l. c., t. 11; Rchb. Ic. Fl. Germ. XXIV, t. 277, fig. 1–7; Fl. Yugo-Vost. IV (1930) 177, fig. 267. — Exs.: Fl. Hung. exs. no. 542; Herb. norm. Dörf. no. 5163; HFR no. 183.

Annual, 5–80 cm high, mostly branched; stem yellowish-green or reddish, covered with short crisp hairs, subsequently glabrescent; leaves linear-filiform to filiform, thickish, hairy, subtending reduced leafy branchlets; inflorescence interrupted-spiciform, long; flowers in glomerules of 1–3; perianth covered with long silky hairs, bearing in fruit winglike unequally toothed appendages; seeds ovate to subrotund, 1.5–2 mm long, with prominent embryo. May–September. (Plate V, Figure 15).

Sands, sandy steppes, sandy riverbanks, sandy pine woods, and embankments. European part: V.-Kama, U.Dnp., M.Dnp., V. Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., E. Transc.; W. Siberia: U. Tob., Irt., Alt.: E. Siberia: Ang.-Say.; Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Centr. Eur. (Rumania), Med., Bal.-As. Min. (Serbia, Bulgaria), Mong. (W.). Described from the vicinity of Cherkassy (sub *Salsola laniflora*).

Economic importance. The seeds contain saponin. The plant may be used, according to Rollov, for soda extraction, but exploitation is hardly worthwhile because of the minute amounts of plant material involved.

3. *K. iranica* (Hausskn. et Bornm.) Litw. in exsicc. turk. no. 297, 405 ex Bornm. in Bull. d. l'Herb. Boiss. 2 sér. VIII (1908) 546. — *Salsola iranica* Hausskn. et Bornm. in Bornm. exs. Pers. austro-cr. no. 5072, 5074, 5074b. — *Bassia iranica* Bornm. in Fedde, Repert, sp. nov. XVII (1921) 276. — *K. odontoptera* Schrenk var. γ in Bull. Acad. Sc. Petersb. I (1843) 361. — *K. odontoptera* γ curta Moq. in DC. Prodr. XIII, 2 (1849) 132; Fenzl in Ldb. Fl. Ross. III (1851) 749. — Exs.: Sintenis Iter transcasp. pers. no. 528. 1321 c; Litw., l. c.

Annual, 5–50 cm high, divaricately branched from base; branches elongated, ascending, the lower ones approximate; stem and branches covered with crisp hairs; leaves short, linear to oblong-linear, sessile, flat, woolly; inflorescence paniculate, with divaricate or pendulous branches; flowers in glomerules of 3; perianth heavily woolly, winged in fruit above the middle; wings well developed, scarious, broadly obovate to suboblong-oval, narrowed at base, with unequally toothed margin, the longitudinal veins all equally developed; seeds rotund or round-ovate, 1–1.25 mm long, compressed, olivaceous, naked and smooth. June–August. (Plate V, Figure 12).

Stoney and clayey solonchaks slopes, takyrs, solonchaks, especially in sandy areas; mostly solitary. — Caucasus: S. Transc. (Aralykh); Centr. Asia: Ar.-Casp., Balkh., Kara K., Mtn. Turkm., Amu D., Syr D., Pam.-Al. Gen. distr.: Iran., Dzu.-Kash. Described by Schrenk from the Chu River area. Type in Leningrad.

Note. Shugnan plants differ somewhat from the typical in the more spreading indument on the upper part of the stem and the more elegant aspect (subsp. *pamirica* Iljin).

4. *K. schrenkiana* (Moq.) Iljin comb. nov. — *K. odontoptera* β *schrenkiana* Moq. in DC. Prodr. XIII, 2 (1849) 132; Fenzl in Ldb. Fl. Ross. III, 749. — *K. stellaris* auct. Fl. turk., non Moq.

Annual, 10–60 cm high, branched from base, the stem and branches covered with short crisp hairs; leaves linear to linear-oblong, short, woolly, flat, the bracteal shorter; inflorescence paniculate, with divaricate branches; flowers mostly 3 in the glomerule, the densely woolly perianth 5-winged in fruit above the middle; wings linear to oblong, the scarious margin mostly strongly incised-toothed; the broad thick midnerve of perianth lobes produced into a long tip; seeds ovate to rounded-ovate, 0.8–1.2 mm long, flattish, olivaceous, naked and smooth. May–June. (Plate V, Figure 8).

Sandhills, sandy *Haloxylon* stumps, and sandy places. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D., Kara K. Gen. distr.: Dzu.-Kash. Described from the sands of Central Asia. Type apparently not to be found in herbaria.

5. *K. krylovii* Litw. in Kryl., Fl. Alt. V (1909) 1121; Anim. syst. ex Herb. Univ. Tomsk. no. 2 (1929); Kryl., Fl. Zap. Sib. IV (1930) 917. — Exs.: HFR no. 3084.

Annual, 5–25 cm high, divaricately bushy-branched from base, the stem and branches villous with long horizontally spreading hairs; leaves linear to filiform-linear, semiterete, obtuse, narrowed toward base; flowers mostly paired in the leaf axils almost from the base of the stem; fruiting perianth 5-winged; wings stellately expanded in one plane, oblong-ovate to ovate-lanceolate, entire, mostly reddish, usually rounded at summit. June. (Plate V, Figure 16).

133

Taluses, gravelly slopes, pebbles, sand-and-pebble deposits and river valley sands. — W. Siberia: Alt. Gen. distr.: Mong. Described from the Chuya Steppe in Altai. Type in Tomsk; cotype in Leningrad.

6. *K. melanoptera* Bge. Enum. Salsol. Centralasiat. in A. H. P. VI, 2 (1880) 417.

Annual, 5–25 cm high, glaucescent, mostly blackening in drying, branched from base, the stem and branches covered with rather short subpatulous or somewhat tangled hairs; leaves linear to filiform-linear, semiterete, very slightly narrowed toward base, hairy or subsequently glabrescent; flowers mostly paired, in the axils of nearly all leaves, with hairy or glabrate perianth, 3-winged in fruit; wings lanceolate to oblong, mostly narrowed at summit, entire, with very prominent nerves or mostly almost black; two of the perianth segments entirely wingless or with rudimentary tuberclelike upturned outgrowths or very rarely all 5 wings developed and then 2 of them smaller. June–August. (Plate V, Figure 17).

Gravelly deserts; clayey solonchic places, dry sandy riverbeds, resting places for cattle, and cultivated fields. — Centr. Asia: T. Sh. Gen. distr.: Dzu.-Kash., Mong., Tib. Described from Kutemaldy near Lake Issyk-kul'. Type in Leningrad.

Section 2. *SEMIBASSIA* Beck. in Rchb. Ic. Fl. Germ. XXIV (1908) 154. — Perianth lobes glabrous or nearly so, except for the long-ciliate margin, transversely keeled, tubercled or winged at the middle of the keel.

7. *K. scoparia* (L.) Schrad. in Neues Journ. III, 3, 4 (1809) 85; Fenzl in Ldb. Fl. Ross. III, 746; Turcz., Fl. baic.-dah. II, 32; Shmal'g., Fl. II, 364; Il'in in Fl. Yugo-Vost. IV, 178. — *Chenopodium scoparium* L. Sp. pl. (1753) 221. — *Salsola scoparia* M. B. in Mém. Soc. Nat. Mosc. I (1811) 144. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 278. — Exs.: Sintenis iter transcasp. pers. no. 2185.

Annual, 30–150 cm high, green or reddening toward fall, strongly branched; stem and branches upright, covered in upper part with thin crisp hairs; leaves alternate, lanceolate to linear-lanceolate, flat, acute, narrowed at base into a petiole, mostly 3-nerved, glabrous or with short appressed hairs sometimes confined to the underside, the margin long-ciliate; inflorescence remotely spiciform; flowers mostly 1 or 2 (up to 5) in the axils of bracts; fruiting perianth of perfect flowers mostly transversely keeled, tubercled or sometimes winged at the middle of the keel; female flowers mostly without a keel; seeds mostly ovate, 1.5–2 mm long. July–October. (Plate V, Figure 9).

Ornamental and vegetable gardens, refuse dumps. Growing singly or in groups. — European part: U.Dnp., M.Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., S. and E. Transc.; W. Siberia: U. Tob.; Far East: Ze.-Bu., Uss.; Centr. Asia: throughout. Gen. distr.: Centr. Eur., Med., Bal.-As. Min., Iran., Ind.-Him., Jap.-Ch. Described from Greece and from Japan. Type in London.

Economic importance. Cultivated for broom-making and for bedding out as a special garden form (*f. trichophila* Schinz et Thell. Verz. Säm. Bot. Garten Zürich (1909) 10 = *K. trichophila* Hort.) with narrow subuliform upper leaves which impart to the plant the appearance of a compact oblong or obovoid shrublet. The seeds contain saponin.

8. *K. sieversiana* (Pall.) C. A. M. in Ldb. Fl. Alt. I (1829) 415. — *Suaeda sieversiana* Pall. Illustr. (1803) 45. — *Salsola soongorica* Sievers in herb. ex Pall., l. c. — *Kochia densiflora* Turcz. in DC. Prodr. XIII, 2 (1849) 131. — *K. scoparia* β *subvillosa* Moq. Chenop. (1840) 91. — *K. scoparia* var. *densiflora* Moq. in DC. Prodr. XII, 2 (1849) 131; Kryl., Fl. Zap. Sib. IV, 918; Turcz., Fl. baic.-dah. II, 33. — *K. scoparia* var. *soongorica* Moq., l. c. — (?) *K. scoparia* var. *sieversiana* Graebn. in Asch. et Graebn. Syn. V (1913) 163. — Ic.: Pall. Illustr. t. 38.

Annual, 10–100 cm high, erect, mostly branched from base, the stem and branches yellowish-green or reddish, densely covered especially near summit with crisp hairs, in lower part subsequently glabrescent; lower branches often ascending from decumbent base; lower leaves often oblong-obovate or oblanceolate, obtusish, narrowed to a petiole, the others oblong or lanceolate to linear, very slightly narrowing at base, acuminate, all entire, flat, hairy or glabrate except for the sometimes long-ciliate margin; inflorescences compact, spiciform, cylindric or more often oblong-claviform; flowers in glomerules, mostly paired, enveloped in tufts of long white conspicuous hairs imparting a tomentose-woolly appearance to the whole inflorescence; fruiting perianth 5-winged; wings short, thickish, rotund to oblong-rotund, crenate, distinctly reticulate. July–August. (Plate V, Figure 6).

Sands, sandy riverbanks, pebbles, gravelly slopes, resting places for cattle, refuse dumps. — W. Siberia: Alt., E. Siberia: Dau.; Centr. Asia: Dzu.-Tarb. Gen. distr.: Dzu.-Kash., Mong. Described from Chinese Dzungaria. Type in London.

135 Tribe 7. **CORISPERMEAE** Moq. Chenop. (1840) 101. — Annual plants with branched hairs, rarely glabrous; bracteoles wanting; perianth scarious, not changing in fruit, the segments distinct or more rarely united below; stamens 1–5; fruit strongly exserted from the perianth, flattened; seeds vertical; embryo annular.

Genus 413. **CORISPERMUM** *L.

L. Gen. pl. ed. 5 (1754) 5.

Flowers perfect; perianth small, scarious, white, of 1–5 segments, or perianth wanting, perianth segments mostly toothed or incised-dissected, unequal, the posterior larger and persistent, the 2 anterior ones very small; stamens 1–5, mostly 1–3; anthers ovaloid to subglobular, unappendaged; stigmas 2, on an obsolescent style; fruits strongly flattened, rotund to oblong-oval, mostly convex on the front, concave or flat on the back, the margin often winged. Plants with alternate narrow simple leaves. The genus contains about 50 to 60 species.

1. Fruit hairy on both sides or only on the anterior side 2.
- + Fruit naked 6.
2. Fruit and more particularly its fleshy wings transversely pustulose-plicate 34. *C. ulopterum* Fenzl.
- + Fruit always smooth, never plicate 3.
3. Lower and middle leaves rather gradually acuminate. Siberia 16. *C. redowskii* Fisch.
- + Lower and middle leaves rounded at apex and minutely mucronulate. Central Asia 4.
4. Fruit wingless, with a strongly convex outer and flat inner face 20. *C. piliferum* Iljin.
- + Fruit winged 5.
5. Body of fruit convex, the semipellucid wings woolly; inflorescence compact. Pamir 30. *C. gelidum* Iljin.
- + Body of fruit flattened, the opaque wings flat or nearly so; inflorescence rather loose. Kara-Kum sands and sands in the Lake Balkhash area 29. *C. korovini* Iljin.
- 136 6. Perianth none or reduced to a very narrow strongly dissected posterior segment, in upper flowers always wanting or the posterior segment replaced by 2 rudimentary strongly dissected lobules . . . 7.
- + Perianth present in all flowers, at least in the form of a well developed posterior segment 12.
7. Beak divisions of the fruit divergent and somewhat arched-recurved. Siberia 8.
- + Beak divisions of fruit straight, not recurved. Europe (see, however, *C. komarovii*) 9.
8. Wings reduced to a narrow transparent rim . . . 4. *C. squarrosus* L.
- + Wings well developed, one-sixth to one-third as broad as the kernel 5. *C. crassifolium* Turcz.
9. A small plant of the mountain rivers of Siberia; fruit broad-winged, truncate at summit 6. *C. komarovii* Iljin.
- + European plants, mostly larger 10.

* From the Greek words *coris*, bedbug, and *sperma*, seed.

10. Fruit broad-winged, conspicuously notched at summit; wings one-third to one-half as broad as the kernel, crenate 1. *C. marschallii* Stev.
- + Fruit with wing merely one-eighth to one-fourth as broad as the kernel; apical notch none or obsolescent 11.
11. Perianth wanting or in few flowers represented by a rudimentary segment; fruit wings subentire. Basins of rivers opening into the White Sea 2. *C. algidum* Iljin.
- + Perianth formed by 2 strongly incised posterior segments; fruit wings crenulate. Western Ukraine 3. *C. canescens* Kit.
12. Fruit wingless 13.
- + Fruit winged, the wing represented at least by a narrow rim (see, however, *C. declinatum*, *C. chinganicum*, and *C. aralo-caspicum*) 15.
13. Small plants of the Pamir, densely hairy throughout; the margins of the somewhat purplish fruit abruptly subacutely tapering 24. *C. pamiricum* Iljin.
- + Plants almost glabrous or hairy only in inflorescence; margins of fruit not tapering 14.
14. Fruit 1.5–2.25 mm long, mostly transversely rugose on both sides or merely on the back; the elongated and often almost glabrous bracts conspicuously scarious-margined 21. *C. mongolicum* Iljin.
- + Fruit 2–3 mm long, always smooth on both sides; the rather densely hairy bracts not conspicuously scarious-margined 19. *C. orientale* Lam.
- 137 15. Wing abruptly constricted at summit, forming a crown (see Plate VI, Figure 4) 27. *C. dutreuilii* Iljin.
- + Wing not crowned 16.
16. Fruit broadly triangular-tapering to a beak 17.
- + Fruit notched or rounded at summit 24.
17. Arenarous plants fruiting from April to June; fruit papillose or verrucose 28. *C. papillosum* (O. Kze.) Iljin.
- + Plants flowering in the second half of summer; fruit smooth 18.
18. Fruit rounded-oval, oval or obovate, the cleft between the remnants of stigmas mostly not extending below the level of the wings. Plants of Central Asia 19.
- + Fruit oblong-oval or oblong. Predominantly Siberian-Mongolian plants 22.
19. Plants of the Pamir 20.
- + Plants of sandy plains 21.
20. Glabrous plants 26. *C. hilariae* Iljin.
- + Hairy plants 25. *C. tibeticum* Iljin.
21. Lower leaves oblanceolate to oblong-oblanceolate 22. *C. lehmannianum* Bge.
- + All leaves very narrow, often subfiliform and convolute, except for sometimes flat lowermost ones 23. *C. heptapotamicum* Iljin.
22. Wings rising high up on the beak so that the cleft between its divisions mostly descends below the level of the wings; inflorescences commonly loose; bracts with an inconspicuous scarious rim 23.

- + Wings not extending to the beak and thus the cleft situated above the level of the wings or reaching their margins; bracts of the compact inflorescence imbricated, with a well defined broad scarious rim 12. *C. chinganicum* Iljin.
23. Fruit dull, broadest in upper half; usually almost glabrous weeds with drooping branches 11. *C. declinatum* Steph.
- + Fruit somewhat lustrous, broadest about the middle; inflorescence commonly very hairy 13. *C. altaicum* Iljin.
24. Fruit notched at summit, at least slantingly 25.
- + Fruit rounded at summit (see, however *C. filifolium*) 29.
25. Inflorescences loose, with very remote fruits, the short bracts much shorter than the fruit; plants of sandy deserts 26.
- 38 + Inflorescences very compact, the bracts completely covering up the fruits except the lowermost. Riverside plants of W. Siberia and the Far East 27.
26. Yellowish-green densely hairy plants, fruiting in June and July; lower leaves oblanceolate to oblong-oblanceolate 8. *C. laxiflorum* Schrenk.
- + Dark green or green plants, glabrous or nearly so, fruiting from August onward; leaves linear to filiform 7. *C. aralo-caspicum* Iljin.
27. Fruit very large, 4.5—6.25 mm long 33. *C. macrocarpum* Bge.
- + Fruit smaller 28.
28. Fruit oblong-oval; bracts long-acuminate 31. *C. elongatum* Bge.
- + Fruit subrotund; bracts broad, subrotund, abruptly apiculate 32. *C. confertum* Bge.
29. Leaves subfiliform, tubularly convolute 30.
- + Leaves flat 31.
30. Fruit large, 4—5 mm long, the wings one-fourth to two-thirds as broad as the kernel 10. *C. filifolium* C. A. M.
- + Fruit smaller, 2.5—3.5 mm long, the rather thick wings one-tenth to one-fourth as broad as the kernel 9. *C. nitidum* Kit.
31. The cleft between the beak divisions broad and slanting. Altai 17. *C. erosum* Iljin.
- + The cleft narrow 32.
32. Wings well developed, thin, semipellucid, one-sixth to one-third as broad as the kernel, completely covered by the bracts 15. *C. sibiricum* Iljin.
- + Wings reduced to a narrow rim, one-fifteenth to one-eighth as broad as the kernel, thickish 33.
33. Inflorescence slenderly cylindric (2—3 mm in diameter), elongated; bracts not covering the sides of the fruits 18. *C. krylovii* Iljin.
- + Inflorescence more compact; bracts fully covering the fruits 14. *C. hyssopifolium* L.

1. *C. marschallii* Stev. in Mém. Soc. Nat. Mosc. V (1814) 336; Il'in in Fl. Yugo-Vost. IV, 182. — *C. marschallii* β *nudiflorum* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 763. — *C. intermedium* β *marschallii* Schmalh., Fl. II (1897) 361. — *C. hyssopifolium* var. *marschallii* Fiori et Paol. Fl. It. I (1898) 315. — *C. borysthenicum* Andr. in Kiev. Univ. Izv. 7 (1862)

139 134. — *C. henningii* Goldb. in Herb. Inst. Bot. Ac. Sc. URSS. — *C. dubium* Goldb., l. c. — *C. squarrosum* M. B. Fl. taur.-cauc. I (1808) 3 (non L.). — Ic.: Syreishch., Ill. Fl. Mosk. g. II, p. 93.

Annual, 5–25 cm high, with scattered hairs or more rarely glabrate; leaves linear to oblong-lanceolate, flat, rarely convolute (var. *angustifolium* Iljin in Bull. Jard. Bot. Princ. de l'URSS, XXVIII, 5–6 (1929) 641); inflorescence spiciform, compact, rather short, rarely elongated and remotely flowered (f. *remotiflorum* Iljin hoc loco); bracts ovate or oblong-ovate to narrowly lanceolate, mostly broadly white-scarious-margined, usually covering only the middle part of the fruit, rarely all of it, always at least slightly surpassing the fruit, appressed or subappressed, at fruit shedding often divaricate; perianth none or very rarely some flowers with rudimentary perianth lobes; stamens 1–3, rarely 5; fruit broad-winged, subrotund to oval, (3.5)4–5 mm long and (3)3.5–4.5 mm broad, flat on both sides or with convex outer face, the wing distinctly notched at summit; wings broad, mostly one-third to half as broad as and lighter-colored than the dark olivaceous kernel, their margin crenate. July–August. (Plate VI, Figure 8).

Alluvial sands and river flats; in groups. — European part: Bl., M. Dnp., U. Dnp., U. V., V.-Kama, V.-Don, L. Don, L. V., Transv. Gen. distr.: Centr. Eur. (Germany) and Med. (only in the Po Valley). Described from the lower reaches of the Dnieper. Type in Helsinki.

2. *C. algidum* Iljin in Bull. Jard. Bot. Princ. de l'URSS, XXVIII, 5–6 (1929) 642 (excl. specim. sibir.). — *C. intermedium* auct. ross. plurim., non Schweigg.

140 Annual, 3–15 cm high, with scattered hairs, subsequently glabrate in lower part, the stem simple or with prostrate branches; leaves oblong-linear to linear, flat, gradually narrowing toward base, the upper ones gradually passing into bracts, inflorescence densely flowered, rather short, ovaloid or ovoid, rarely oblong-cylindric; bracts oblong-ovate to ovate, the lower ones more elongated, acuminate, rather broadly white-rimmed, nearly always completely covering up and scarcely overtopping the fruits; perianth none or very occasionally represented by small and narrow rudimentary lobes; stamens 1–3; fruits oval to rounded-oval, 3–4 mm long and 2.25–3 mm broad, rarely larger and up to 5 mm broad (var. *macrosperrum* Dobroch. in Bull. Soc. Nat. Mosc. XLV, 3 (1936) 216), convex in front, flat or nearly so at the back, lustrous, olivaceous or dark green, winged; wings subentire, yellowish-green, almost transparent, one-eighth to one-fourth as broad as the kernel, rounded or obsoletely and slantingly notched at summit with 2 straight remnants of stigmas in the middle of the notch, the cleft between the stigmas often descending below the wing margin. July–August.

Northern riverside sands; in groups. — European part: Dv.-Pech. Endemic. Described from the vicinity of Shenkursk. Type in Leningrad.

3. *C. canescens* Kit. in Schult. Oesterr. Fl. ed. 2, I (1814) 7. — *C. hybridum* Andr. in Kievsk. Univ. Izv. 7 (1862) 135. — *C. marschalli* var. *floridum* lus. 3 Fenzl in Ldb. Fl. Ross. III, 2 (1851) 763 (p. p.). — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 285, f. 1–7.

Annual, 15–70 cm high, hairy, branched from the base; leaves linear to linear-lanceolate, flat; inflorescence compact or more rarely loose, slenderly

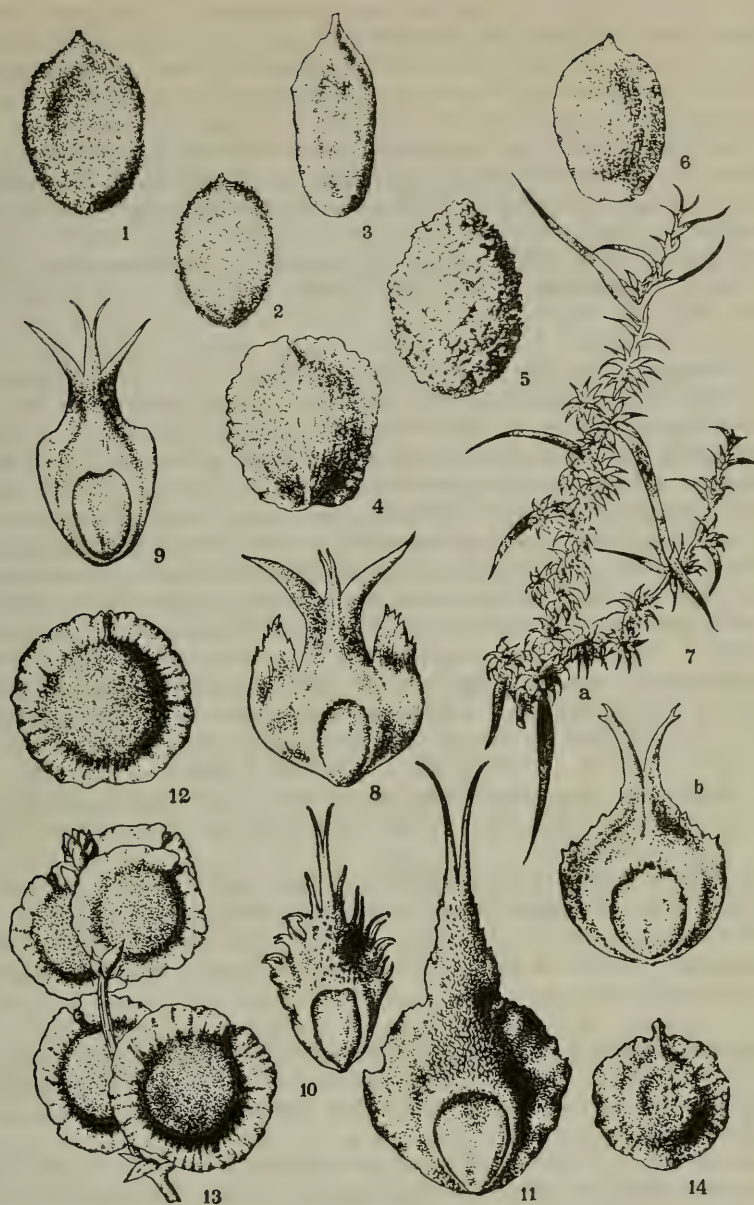


PLATE VII. 1. *Corispermum korovini* Iljin. — 2. *C. piliferum* Iljin. — 3. *C. declinatum* Steph. — 4. *C. redowskii* Fisch. — 5. *C. ulopterum* Fisch. — 6. *C. papillosum* (O.Kze.) Iljin. — 7. *Agriophyllum arenarium* M.B.: a) branch, b) fruit. — 8. *A. minus* Fisch. et Mey. — 9. *A. lateriflorum* Moq. — 10. *A. palezkianum* Litw. — 11. *A. latifolium* Fisch. et Mey. — 12. *Anthochlamys polygaloides* var. *turkestanica* Iljin. — 13. *A. turcomanica* Iljin. — 14. *A. polygaloides* (Fisch. et Mey.) Fenzl.

elongate or short and stout; bracts oblong-ovate to lanceolate, narrowly white-scarious-margined, longer than and as broad as or rarely very slightly narrower than the fruit, the lowermost leaflike; perianth mostly consisting of very strongly dissected segments, 2 posterior and 1 anterior, or else perianth wanting; stamens 1–3 (5); fruit oval to rounded-oval, 3.5–4 mm long and 2.5–3.25 mm broad, pale green, slightly convex or almost flat in front, rounded on both sides; wings yellowish, finely toothed, about one-quarter the width of the kernel, with a slight notch at the summit. June–August.

Alluvial sands and sandy steppes; in groups. — European part: M. Dnp., U. Dnp. (Kiev). Gen. distr.: Centr. Eur. Described from the vicinity of Budapest. Type in Vienna.

4. *C. squarrosus* L. Sp. pl. (1753) 4 (non Pall.); Iljin in Bull. Jard. Bot. Princ. XXVIII (1929) 650; Kryl., Fl. Zap. Sib. IV, 925 (pro parte). — *C. hysso-pifolium* (non L.) Kryl. Fl. Alt. V (1909) 1125 (pro parte).

143 Annual, 5–40 cm high, branched from the base, glabrous or with scattered hairs; leaves oblong-linear to linear, slightly narrowing at base, spreading; bracts of the mostly compact inflorescence ovate to oblong-ovate, completely covering and surpassing the fruits; perianth none or merely represented by a rudimentary strongly incised single segment; stamens 1–5; fruit oval, 2.3–3.25 mm long and 2–2.5 mm broad, convex at the front, flat at the back, glabrous, lustrous, olivaceous, rounded at summit and abruptly short-beaked, the broad cleft between the divergent and recurved styles not reaching the fruit margin; wings narrow, thin, scarious, pellucid, mostly hairy, rarely the fruit almost wingless. July–August. (Plate VI, Figure 13).

Sandy riverside areas. — European part: Transv. (vicinity of Orenburg [Chkalov]); W. Siberia: Ob (Tomsk); E. Siberia: Yenisei (S.), Ang.-Say. (W. Sayans). Endemic. Described from the Central Volga region, apparently from the vicinity of Orenburg: "ad Wolgam Tatariae, inque terra Cosacorum." Type in London.

Note. Three races can be distinguished: 1) Ural race — subsp. *uralense* Iljin (l. c.), distinguishable by the almost wingless fruits; 2) sylvatic Siberian — subsp. *silvicola* Iljin (l. c.) with narrow wings, and 3) Sayan mountain race — subsp. *monticola* Iljin (l. c.) with relatively broad often revolute wings.

5. *C. crassifolium* Turcz. in Bull. Soc. Nat. Mosc. XXV (1852) 428. — *C. algidum* Iljin in Bull. Jard. Bot. Princ. de l'URSS XXVIII, 5–6 (1929) 642 (specim. sibir.). — *C. intermedium* Turcz. Fl. baic.-dah. II, 2 (1856) 37 (non Schweigg.).

Annual, dwarf, 3–15 cm high, prostrate-branched, with scattered hairs; leaves mostly linear to oblong-oblancheolate, 2–8 mm broad; inflorescences short and stoutish, oblong-ovaloid to subspherical, compact; bracts oblong to oblong-ovate, acuminate, completely covering and longer than the fruits; perianth none or occasionally represented by rudimentary segments especially at the summit of the inflorescence; fruit oval, 3.5–5 mm long and 3–4 mm broad, convex at the front, flat or scarcely concave at the back, dark green, winged; wings yellowish, almost transparent, entire, often hairy, one-sixth to one-third (commonly one-fourth) as broad as the kernel, rounded at apex, the short vestigial stigmas recurved.

Sand bars and river pebbles. — E. Siberia: Yenisei, Ang.-Say, Lena-Kol. Endemic. Described from the vicinity of Krasnoyarsk. Type in Leningrad.

Note. A species strikingly resembling *C. squarrosus* L., from which it differs chiefly in the larger fruits and their broad wings.

6. *C. komarovii* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, II (1936) 125.

Annual, 3–7 (always ?) cm high; stem slender, rosy-purple, covered with somewhat spreading branched hairs; leaves narrowly linear, 1–1.5 mm broad, thickish, almost flat or slightly involute, less hairy than the stem and often glabrate except for the more hairy gradually dilated base, the tips often recurved; bracts ovate to oblong-ovate, scarious-rimmed, hairy, acute, often with a very short uncinately recurved tip, narrower than and of equal or slightly greater length than the fruit, except for the narrower lowermost bracts which are 1.5–2 times as long as the fruit; inflorescences short and compact, ovoid to capitate; perianth mostly consisting of a single oval-oblong, or oblong to lanceolate incised-toothed or merely toothed single segment or, especially in upper flowers, perianth lacking altogether; stamens 1 or 3 or more rarely 5; fruit oval, 4–4.5 mm long and 3–3.6 mm broad, broadest at the middle or rarely somewhat above the middle, 1.15–1.4 times as long as broad, somewhat convex at the front, dark olivaceous, dull, broad-winged, the narrow cleft between the persistent upright styles penetrating into the wing; wings semitransparent especially at the margin, unequally crenulate, nearly half as broad as the kernel, often pink or smoky pink. July.

Pebbles of mountain streams. — E. Siberia: Ang.-Say. Endemic. Described from the area of the Tunkinskies Mountains — Mt. Belaya in the Ekhe-Ogun River valley. Type in Leningrad.

7. *C. aralo-caspicum* Iljin in Bull. Jard. Bot. Princ. de l'URSS, XXVIII, 5–6 (1929) 637; Iljin in Fl. Yugo-Vost. IV, 182. — *C. laxiflorum* subsp. *autumnale* Iljin, l. c. — Ic.: Fl. Yugo-Vost. IV, fig. 268.

Annual, 10–60 cm high, mostly divaricately branched, glabrous or merely with scattered hairs, commonly dark green; leaves linear to subfiliform, the lower ones narrowing toward base; inflorescence slender, the fruits remote; bracts linear, equaling or exceeding the fruit (the lower ones several times as long) or rarely shorter, always narrower than the fruit; perianth mostly of 1–3 segments, the posterior segment large, broad, crenate; stamens 3–5; fruit flat, mostly rotund, 3.5–5.75 mm long and 3–5.5 mm broad, broad-winged; wings one-fourth to one-half as broad as the kernel, more rarely broader or narrower, sinuate-dentate or rarely subentire, with a semi-transparent margin, rather shallowly and slantingly notched at summit or sometimes without a notch. Fl. June–September; fr. August–October.

Sandhills, and at the foot of barchan dunes, saline sands in depressions and on seashores; more or less scattered. — European part: L. V.; Caucasus: Dag., E. Transc. (seacoast); Centr. Asia: Ar.-Casp. Gen. distr.: Iran. (the part of Iran bordering the Caspian Sea). Type specimens from Lake Baskunchak. Type in Leningrad.

Note. Throughout the littoral strip of the Caspian Sea this species has produced a distinct race that differs from the type in having narrow subentire leaves and wings destitute of apical notch (subsp. *caucasicum* (Bge.) Iljin, l. c., 638 = *C. laxiflorum* var. *caucasicum* (Bge.) Iljin in

Grossg., Fl. Kavk. II, 1930, 68 = *C. nitidum* var. *caucasicum* Bge. in Iljin Fl. Yugo-Vost. IV, 1930, 183) or quite wingless (*f. apterum* Iljin, l. c.).

Economic importance. Considered as good forage for all kinds of livestock, especially in the summer. Analysis of budding plants from [the former] Bukey Province (Urda), erroneously designated as *C. intermedium*, gave the following results: water 9.33% and, for digestible components in percentages of absolute dry weight, crude protein 6.92, albumin 5.05, fat 1.00, cellulose 6.29, nitrogen-free extract 38.31; starch equivalent computed for initial fresh weight 36.33 and for absolute dry weight 40.07; ratio of digestible protein to nitrogen-free extract 1:9; percentage digestibility for all organic compounds 57.4, and 59.82, 61.77, 26.38, 30.51, 71.60, for crude protein, albumin, fat, cellulose, and nitrogen-free extract, respectively (Zhugina and Salin).

8. *C. laxiflorum* Schrenk in Bull. Acad. Sc. St. Pétersb. I (1843) 361. — *C. marschalli* α *floridum* lus 1 Fenzl in Ldb. Fl. Ross. III (1851) 763. — *C. marschalli* var. *laxiflorum* Trautv. in Bull. Soc. Nat. Mosc. XL, 3 (1867) 60.

Annual, 10–40 cm high, yellowish-green, always hairy; lower leaves oblanceolate or narrower, the others linear to linear-filiform; inflorescence slender and very loose; bracts lanceolate to ovate, divergent in fruit, the lower about equaling the fruit, the others shorter and narrower; perianth of 1–3 segments; stamens 3–5; fruit oval-rotund to rotund, 3.5–5 mm long and 3.5–4 mm broad, flat, naked, lustrous, yellowish-brown, notched at summit, broad-winged; wings lighter-colored, semitransparent, one-fourth to one-half as broad as the kernel, remotely sinuate-denticulate in upper part. Fr. June–July. (Plate VI, Figure 5).

Sandhills, and at the foot of barchan dunes. — Centr. Asia: Ar.-Casp. (E.), Balkh., Kyz. K. Endemic. Described from the Sarysu River valley. Type in Leningrad.

Economic importance. Readily eaten by all kinds of livestock (I. Larin).

9. *C. nitidum* Kit. in Schult. Oesterr. Fl. 2 Aufl. I (1814) 7; Fenzl in Ldb. Fl. Ross. III, 761 (excl. spec. sibir. et turkom.); Il'in in Fl. Yugo-Vost., IV, 180. — *C. hyssopifolium* β *nitidum* Schmalh. Fl. II (1897) 362. — *C. microspermum* Host, Fl. Austr. I (1827) 319. — *C. hyssopifolium* α *microcarpum* Neilr. Fl. Wien. (1846) 192. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 284; Hegi III. Fl. Mittel, III, 252.

146 Annual, 10–50 cm high, divaricately branched from the base, green or more rarely purple (*f. purpurascens* Moq. in DC. Prodr. XIII, 2 (1849) 141. — *C. purpurascens* Host. Fl. Austr. I (1827) 318), glabrous except for scattered hairs on the young parts; leaves subfiliform or more rarely narrowly linear, commonly with involute margins; inflorescence slender, elongate, with rather remote fruits; bracts broadly scarious-margined, the lower ones narrow, leaflike, greatly exceeding the fruit, the others mostly ovate, usually covering the fruit completely or in upper fruits leaving only the wings uncovered, point-tipped above the fruit; rarely the inflorescence compact (*f. densiflorum* Iljin); perianth mostly consisting of a single posterior coarsely toothed segment and more rarely with 2 small additional anterior-lateral segments; stamens 3–5; fruit oval to rounded-oval, 2.5–3.5 mm long and 2–2.75 mm broad, with convex outer and flat or slightly

concave inner face, naked, smooth, scarcely lustrous, olivaceous, narrow-winged; wings opaque, tawny, entire, thickish, one-tenth to one-fourth as broad as the kernel. July–September. (Plate VI, Figure 10).

Riverside and maritime sands; also as weed in cultivated fields. — European part: Bl., Crim. (N.), M. Dnp., U. Dnp. (S.), V.-Don (S.), L. Don. L. V. (W.); Caucasus: Cisc. (?). Gen. distr.: Centr. Eur., Bal. (N.). Described from the vicinity of Budapest. Type in Vienna.

Note. The species *C. coloratum* Andr., described by Andrzhevskii in Kievsk. Univ. Izv. 7 (1862) 135, is but a form of this species, characterized by a compact slenderly elongate claviform inflorescence, with broadly scarious-margined overlapping bracts. Known only from the classical location on an island near Kiev, it has not so far been reported elsewhere.

Economic importance. Considered to be a good forage plant for all kinds of livestock, comparable in quality to alfalfa hay in flower or to good meadow hay. Analysis of budding plants from the Lake El'ton area gave the following composition in percentages of fresh weight: hygroscopic water 18.68, ash 8.37, crude protein 10.43, albumin 9.68, crude fat 3.03, crude cellulose 24.68, nitrogen-free extract 34.81; digestion coefficients: crude protein 53.01, albumin 54.08, crude fat 58.10, crude cellulose 40.31, nitrogen-free extract 52.71; digestible substances as percentage of fresh weight: albumin 4.78, crude fat 1.76, crude cellulose 9.95, nitrogen-free extract 18.35; protein ratio 6.7; starch equivalent 21.84; average per capita consumption at 1,000 g daily forage rate — 350 g (Aleksandrovskaia and Beguchev).

10. *C. filifolium* C. A. M. in Bull. Soc. Nat. Mosc. II (1854) 455 et XXXI, 1 (1858) 13; Il'in in Fl. Yugo-Vost. IV, 181. — *C. hyssopifolium* var. *filifolium* Schmalh., Fl. II (1897) 362.

147 Annual, 15–60 cm high, branched from the base, glabrous or on young parts hairy; leaves filiform, semiterete, gradually passing into bracts; inflorescence spiciform elongated, slender, rather loose; lower bracts surpassing the fruit, the upper ones shorter and always narrower, perianth mostly of 3 segments, a large posterior and two small lateral ones or merely one posterior segment; stamens 3–5; fruit oval, 4–5 mm long and 3–4 mm broad, flat or with very slightly convex outer face, naked, smooth, slightly lustrous, broad-winged; wings (one-fourth or) one-third to half as broad as the brownish-green kernel, yellowish or yellowish-green, entire, rounded at summit or obsoletely broadly and slantingly notched at summit or the upper ones subtruncate, with a short narrow cleft between the remnants of styles, rounded or with a slight slanting base. August–September.

Sands in the Volga River valley. — European part: L. V. (Krasnoarmeisk). Gen. distr.: Bal. (Thrace), Centr. Eur. (Hesse-Darmstadt). — adventive? Described from the vicinity of Krasnoarmeisk. Type in Leningrad.

11. *C. declinatum* Steph. ex Stev. in Mém. Soc. Nat. Mosc. V (1817) 384; Il'in in Tr. po prikl. bot., gen. i sel. XIX, 2 (1928) 69 and in Fl. Yugo-Vost. IV, 183; Kryl., Fl. Zap. Sib. IV, 927. — *C. nitidum* Kryl. (non Kit.) Fl. Alt. V (1909) 1126. — Ic.: Il'in in Tr. po prikl. bot. (see above) and in Fl. Yugo-Vost. IV, fig. 269.

Annual, 15–50 cm high, glabrous or covered with scattered hairs, green or reddish, divaricately branched from the base and acquiring a tumble-weed

shape; leaves long, narrow, linear, flat to subinvolute, acuminate, gradually passing into bracts, these lanceolate or attenuate from a broad base; inflorescence slender and rather loose; perianth of a single segment; stamens 1—3, rarely 5; fruit oblong or oval, 3—4 mm long and 1.3—2.5 mm broad, twice as long as broad, broadest above the middle, with convex and slightly buckled outer face and concave inner face, sometimes almost convolute, naked, smooth, dull, olivaceous, narrow-winged; wings one-eighth to one-third as broad as the kernel or rarely fruit wingless (f. *apterum* Iljin), the wings opaque, purple in the red forms, entire or in upper part sometimes remotely and obtusely toothed, short-acuminate at summit. June—September. (Plate VII, Figure 3).

Sandy steppes and slopes; mostly in cultivated and old fields, sometimes completely smothering cereal crops; in groups. — European Part: Lad.-Ilm. (adventive in the city of Leningrad), Transv.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Sây., Lena-Kol (S.), Dau. Gen. distr.: Mong., N. China. Described from Siberia. Type in Leningrad.

12. *C. chinganicum* Iljin in Bull. Jard. Bot. Princ. d. l'URSS, XXVIII, 5—6 (1929) 648.

148 Annual, 10—50 cm high, branched from the base, often purple below, covered with scattered hairs, subsequently often glabrescent; leaves linear, acuminate, flat; inflorescence slenderly cylindric to oblong-ovoid or claviform, dense; bracts closely imbricate, ovate to suborbicular, more rarely oblong-ovate, rarely very broadly white-scarious-rimmed, completely covering the fruit; perianth of 1 or rarely 3 segments, rotund or oval; stamens 1—5; fruit oblong-oval, 3—3.75 mm long and 1.5—2 mm broad, with convex outer and flat or very slightly concave inner face, rounded at summit, very narrowly winged or almost wingless; wings entire. June—July.

Sands. — Centr. Asia: Balkh. Gen. distr.: Mong. Described from the vicinity of Lake Buir-nor in E. Mongolia. Type in Leningrad.

13. *C. altaicum* Iljin in Bull. Jard. Bot. Princ. XXVIII (1929) 646; Kryl., Fl. Zap. Sib. IV, 927.

Annual, 15—40 cm high, grayish-pubescent, branched from the base, the branches elongated; leaves linear-filiform to subfiliform, acuminate; bracts in lower part of the slenderly cylindric inflorescence leaflike, many times as long as and narrower than the fruit, in the middle and upper part of the inflorescence ovate-lanceolate to ovate, completely covering the fruit; perianth of 1 segment; stamens 3—5; fruit oval to oblong-oval, 3.5—4.2 mm long and 2.5—2.75 mm broad, with slightly concave outer face very slightly sagging in the middle and sometimes a somewhat concave inner face, rounded or subtrigonus-rounded at summit, the narrow cleft between the style bases mostly descending below the wing margin, the fruit yellowish-green, dull or scarcely lustrous, naked and smooth, winged; wings entire, subopaque, one-sixth to one-fourth as broad as the kernel. (Plate VI, Figure 1).

W. Siberia: Alt. Endemic. Described from the banks of the Katun River near the village of Chermal (Altai). Type in Tomsk.

14. *C. hyssopifolium* L. Sp. pl. (1753) 4; Fenzl in Ldb. Fl. Ross. III, 759 (p. p.); Shmal'g., Fl. II, 361 (p. p.); Il'in in Fl. Yugo-Vost. IV, 179.

Annual, 10–50 cm high, branched from the base, often at least in lower part purple, hairy; leaves linear-lanceolate to linear, flat; acuminate; inflorescence mostly compact; bracts ovate to oblong-ovate, acuminate, broadly membranaceous, mostly completely covering the fruit; perianth mostly of 1 segment, incised-dentate, more rarely of 3 segments; stamens commonly 3–5; fruit oval to rounded-oval, 2.5–3.3 mm long and 1.75–2.75 mm broad, with convex outer and flat inner face, almost dull; wings reduced to a very narrow pellucid rim, entire or with few dentations, rounded at summit. June–September. (Plate VI, Figure 14).

149

Sandy habitats. — European Part: Bl., V.-Don, L. Don, L. V.; W. Siberia: U. Tob. (W.). Endemic. Described from the Volga region "ad Wolgam Tatariae." Type in London.

15. *C. sibiricum* Iljin in Bull. Jard. Bot. Princ. de l'URSS, XXVIII, 5–6 (1929) 649. — *C. squarrosus* var. *sibiricum* Kryl., Fl. Zap. Sib. IV (1930) 926. — *C. sibiricum* subsp. *jenissejense* Iljin, l. c., 650.

Annual, 5–40 cm high, mostly purple at least in lower part, covered with scattered hairs, subsequently sometimes glabrescent, branched from the base; leaves linear to linear-lanceolate, more rarely subfiliform, constricted to base and apex, more rarely merely short-acuminate, flat; inflorescences elongated, cylindric or shortly claviform, dense; bracts ovate-lanceolate or broad-ovate, scarious-margined, completely covering the fruit; perianth of 1 segment, deeply incised-toothed; stamens 1–5; fruit oblong-oval to oval, 3–4 mm long and 2.2–3 mm broad, with convex outer face slightly sagging at the middle and a scarcely concave inner face, rounded at summit, very faintly lustrous to almost dull, brownish-olivaceous or more rarely green, often speckled, terminating in a short straight beak. winged; wings one-tenth to one-third as broad as the kernel, entire, sub-opaque. August–September. (Plate V, Figure 12).

Riverside sands and pebbles; in groups. — W. Siberia: Alt., E. Siberia: Ang.-Say., Dau., Lena-kol. Endemic. Described from a number of locations, notably reported for the vicinity of Krasnoyarsk. Type in Leningrad.

16. *C. redowskii* Fisch. Cat. Hort. Gorenk. (1808) 25; Turcz. Fl. baic.-dah. II, 2, 38 (pro parte); Fenzl in Ldb. Fl. Ross. III, 764.

Annual, 10–30 cm high, branched, covered with scattered hairs or glabrate; leaves linear, flat, the lower mostly wilting in fruit, obliquely ascending; lower bracts leaflike, longer than and narrower than the fruit, the others ovate to rounded-ovate, mostly completely covering the fruit; perianth of 1 segment, often bifid, sometimes obsolete; stamens 1–3; fruit broad-oval, 4–5 mm long and 3–4 mm broad, stellate-hairy, finally glabrescent, with slightly convex outer and scarcely concave inner face, bent forward at summit, winged; wings one-sixth to one-third as broad as the kernel, wavy, toothed. (Plate VII, Figure 4).

Sandy soils. — E. Siberia: Ang.-Say. (E.), Dau. Endemic. Described from specimens grown at Gorenki from seeds obtained from the Chikhoi River area. Type in Leningrad.

150

17. *C. erosum* Iljin in Bull. Jard. Bot. Princ. URSS, XXVIII, 5–6 (1929) 647. — *C. squarrosus* var. *erosum* Kryl. et Serg. in Kryl., Fl. Zap. Sib. IV (1930) 926.

Annual, 3–15 cm high, branched from the base, the branches elongated; leaves linear, acute or acuminate, narrowing toward base, flat; bracts of the dense oblong-ovoid or cylindric inflorescence lanceolate to increasingly ovate toward summit, acuminate, reflexed at the tips, completely covering the fruit; perianth of 1 segment; stamens 1–3; fruit oval, 2.5–3 mm long and 2–2.2 mm broad, with convex outer face sometimes flat or sagging at the middle and concave inner face rounded at summit, erose-emarginate between the bases of the caducous styles, the notch reaching or just descending below the wing margin, yellowish-green, usually brown at the middle, dull or scarcely lustrous, winged; wings entire, opaque, one-sixth to one-fourth as broad as the kernel. (Plate VI, Figure 2).

W. Siberia: Alt. (Chuya). Endemic. Described from the Chuya Steppe near Kosh-agach. Type in Tomsk.

18. *C. krylovii* Iljin in Bull. Jard. Bot. Princ. URSS, XXVIII, 5–6 (1929) 647. — *C. orientale* var. *krylovii* Schischk. et Serg. in Kryl., Fl. Zap. Sib. IV (1930) 924.

Annual, 10–25 cm high, branched from the base, covered with scattered hairs; leaves linear, acute to subobtuse, flat; lower bracts of the slenderly cylindric inflorescence leaflike and surpassing the fruit, the others lanceolate to ovate, acuminate about as long as but narrower than the fruit, appressed or slightly divergent; perianth of 1 segment; stamens 1–5; fruit oval or rounded-oval, 2.5–3.25 mm long and 2–2.5 mm broad, with convex outer and slightly concave inner face, rounded at summit, the narrow cleft between the style bases reaching the wing margin, yellowish-green, almost dull to scarcely lustrous, narrow-winged; wings entire, opaque, one-fifteenth to one-eighth as broad as the kernel. July–August.

River valleys. — W. Siberia: Alt. Endemic. Described from two Altai specimens collected in the Argut River valley near the mouth of the Karek River, and from the Chulyshman River valley between the Kutuyaryk River and the mouth of the Chul'cha River. Type in Tomsk.

19. *C. orientale* Lam. Encycl. II (1786) 111; Fenzl in Ldb. Fl. Ross. III, 758; Shmal'g., Fl. II, 361; Il'in in Fl. Yugo-Vost. IV, 180; Kryl., Fl. Zap. Sib. IV, 924 (pro parte). — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 283, f. 7–9.

151 Annual, 5–60 cm high, branched from the base, with scattered hairs or often glabrate; leaves linear to linear-lanceolate, flat; bracts oblong to oblong-ovate, completely covering the fruit; inflorescence slender and rather loose; perianth mostly of 1 segment; stamens 3–5; fruit oval, 2–3 mm long and 1.5–2 mm broad, with a concave outer and rather flat inner face, wingless, terminating in a short straight bifid beak. July–September. (Plate VI, Figure 11).

Sandy steppes, valley sands, and sandy pine woods; more rarely in fields on sandy soil. — European part: V.-Don (Voronezh area), L. V.; Caucasus: Dag.; W. Siberia: U. Tob., Irt., Alt.; Cent. Asia: Ar.-Casp., Balkh. Gen. distr.: Centr. Eur. (Hungary). Also reported for Asia Minor, but this needs confirmation. Described from the East, without precise indication of location, "in Oriente." Type in Paris.

Note. A more glabrous form occurs in the eastern part of the distribution area, in the Irtysh, Ishim, and Sarysu river valleys (var. *schrenkii* Iljin, in Krylov, Fl. Zap. Sib. IV, 924), with larger lustrous fruits 3–3.75 mm long and 2–2.75 mm broad, and with longer and more overlapping bracts.

A distinct race occurring in the Muyunkum sands, to some extent in the Barsuki sands, and also in the sands around Lake Balkhash, var. *mujunkumense* Iljin in herb. Inst. Bot. Acad. Sc. URSS, is characterized by a more slender and looser inflorescence and small oblong-oval fruits.

20. *C. piliferum* Iljin in Bull. Jard. Bot. Princ. URSS, XXVIII, 5-6 (1929) 642.

Annual, hairy, divaricately branched from the base; leaves narrowly oblanceolate or oblong, gradually narrowing toward base, subcoriaceous, strongly spreading; inflorescence slender and rather loose; bracts ovate to oblong-ovate, completely covering and scarcely narrower than the fruit; perianth of 1 segment; stamens 1-5; fruit oval, 2-3 mm long and 1.5-2 mm broad, wingless, with strongly convex outer and flat inner face, rounded at summit, covered on both sides with stellate hairs, rufous-brown, almost dull or scarcely lustrous. June-July. (Plate VII, Figure 2).

Valley sands and sand-and-pebble deposits. — Centr. Asia: Syr D. Endemic. Described from the Naryn River valley near Shin-sai in the [former] Andizhan District. Type in Leningrad.

21. *C. mongolicum* Iljin in Bull. Jard. Bot. Princ. USRS, XXVIII, 5-6, (1929 648; Kryl., Fl. Zap. Sib. IV, 925.

Annual, 5-15 cm high, slender, divaricately branched from the base, covered with scattered hairs; leaves filiform to linear-filiform, the lower ones often broader, all acute or acuminate; bracts lanceolate to ovate-lanceolate, completely covering the fruit; inflorescence slender and elongated; perianth of 1 segment; stamens 1-3; fruit oval, small, 1.5-2.25 mm long and 1-1.6 mm broad, with convex outer and concave or almost flat inner face, rounded at summit and at base, naked, very faintly lustrous, becoming dull, mostly transversely rugose, wingless, the very narrow cleft between the style bases not reaching the wing margin. July-September. (Plate VI, Figure 9).

Gravelly and solonchic desert steppes. — W. Siberia: Alt. (Chuya). Gen. distr.: Mong. Described from two specimens collected in Mongolia and Altai, respectively. The specimen to be regarded as the type is the one collected by Klemenetz from a locality between Tugiriv and Bain-khuduk. Type in Leningrad.

22. *C. lehmannianum* Bge. in Reliq. Lehm. (1851) 458; Kryl., Fl. Zap. Sib. IV, 925. — *C. hyssopifolium* γ *remotiflorum* lus 1 Fenzl in Ldb. Fl. Ross. III, 2 (1851) 76. — Exs.: Kar. et Kir. Pl. soong.-kirgh. no. 1910; Sintenis It. transcasp. -pers. n. 332 b.

Annual, 5-40 cm high, with hairy branches; lower leaves oblanceolate or oblong-lanceolate, the middle ones narrowly lanceolate to lance-linear, the upper still narrower; inflorescence slender and rather loose; bracts oblong-ovate to ovate (the lower ones leaflike), longer than and narrower than the fruit, the uppermost equaling or scarcely shorter than the fruit; perianth of 1 segment; stamens 1-5; fruit oval, 2.5-3.5 mm long and 2-2.25 mm broad, light brown or reddish-brown, naked, smooth and lustrous, the outer face flat from the gradual incline of the wings, the inner face flat or scarcely concave, the summit rather broadly triangular or more rarely rounded, with a short 2-toothed beak; wings thickish, opaque, yellowish,

one-twelfth to one-fourth as broad as the kernel, entire or in upper part with distant rounded obsolescent dentations. April–June. (Plate VI, Figure 6).

Sandhills and barchan dunes, exceptionally stony slopes; in groups. — Centr. Asia: Balkh., Kyz. K., Kara K., Amu D., Syr D. (rare). Gen. distr.: Iran., Kash. Described from the Kyzyl-Kum sands between the Kuvan-Darya and Yana-Darya rivers. Type in Leningrad.

23. *C. heptapotamicum* Iljin in Acta Inst. Bot. Ac. Sc. URSS, sér. I, 3 (1936).

153 Annual, 15–40 cm high, light green, with scattered hairs, strongly virgately branched from the base; leaves narrowly linear to filiform, often involute, imperceptibly passing into bracts; inflorescence much elongated; bracts lanceolate to oblong-ovate, scarious-margined, remote, narrower than the fruit and, except for the lower ones, scarcely surpassing or equaling or scarcely shorter than the fruit; perianth of 1 oblong toothed-incised posterior segment, rarely with 2 additional very small anterior-lateral obsolescent segments; stamens 3; fruit oval to rounded-oval to oblong-oval, 2–2.75 mm long and 1.25–2 mm broad, broadest at or just above the middle, with convex outer and scarcely concave inner face, rounded at summit or scarcely short-tapering to a short and straight bifid beak, very narrowly winged; wings yellow, sharply contrasting with the brown or dark green kernel, entire or in upper part scarcely crenulate, at most one-eighth as broad as the kernel or reduced to a very narrow rim. Fr. July–September.

Sandhills and sandy steppes. — Centr. Asia: Balkh. Gen. distr.: Dzu.-Kash. Described from the area between Chingil'da and Iliisk in the Kapal area. Type in Leningrad.

24. *C. pamiricum* Iljin in Acta Inst. Bot. Ac. Sc. URSS sér. 1, III (1936).

Annual, 3–10 cm high, yellowish-green, somewhat purple below, densely hairy throughout, bushy-branched from the base; leaves linear, gradually narrowing toward base, at least the lower ones rounded at apex and mucronate; inflorescence cylindric, slender but compact; bracts oblong-ovate to ovate, scarious-margined, acute, short-apiculate, densely hairy throughout on the back, completely covering the fruit; perianth of 1 oval toothed-incised posterior segment, more rarely with 2 additional very small rudimentary lateral segments; stamens mostly 3; fruit oval to oblong-oval, 2–2.75 mm long and 1.5–2 mm broad, with convex outer face usually slightly caved in or flattened at the middle and almost flat inner face, very lustrous, olivaceous, often brown-speckled, wingless, but the margins obsolescently extended into a transparent rim, the summit produced into a very short straight beak. June–July (Plate VI, Figure 3).

Riverside pebbles. — Centr. Asia: Pam.-Al. (Pamir). Endemic. Described from the Pamir River valley near Langargisht fort. Type in Leningrad.

25. *C. tibeticum* Iljin in Bull. Jard. Bot. Princ. de l'URSS, XXVIII, 5–6 (1929). 644.

Annual, 3–25 cm high, rather densely hairy, branched from base, the elongated lower branches ascending; leaves oblong to oblong-lanceolate or more rarely oblong-obovate, gradually narrowing toward base, obtuse or apiculate or acute at apex, the middle ones mostly somewhat falcate and then one margin convex and the other concave; inflorescence either loose

or fairly compact but relatively slender, bracts ovate, acuminate, broadly white-scarious-margined, completely covering or very slightly narrower though longer than the fruit, only the uppermost equaling or even shorter than the fruit; perianth of 1 segment, subrotund, almost truncate and toothed at apex; stamens 1–5, the filament of the middle stamen 1.5–2 times as long as the perianth; fruit oval to oblong-oval, 3–4 mm long and 2–2.5 mm broad, more or less broadly triangular-tapering at summit, with slightly convex outer and slightly concave inner face, naked and somewhat lustrous, winged; wings semitransparent, yellowish, mostly slightly crenate or entire, one-sixth to one-third as broad as the darker olivaceous kernel. July–November.

Riverside alluvia. — Centr. Asia: Pam.-Al. (Pamir). Gen. distr.: Dzu.-Kash., Tib. Described from Karakorum. Type in London.

26. *C. hilariae* Iljin sp. nova in Addenda V, p. 662.

Annual, 5–10 cm high, bright green, completely glabrous throughout, widely bushy-branched from base, the lower branches ascending; leaves oblanceolate or oblong to oblong-linear, mostly falcate, acute or mucronulate, narrowing toward base, gradually passing into bracts; inflorescence spiciform, relatively slender and rather loose; bracts oblong-ovate or oval (the lower ones lanceolate to linear), broadly white-scarious-margined, acuminate, slightly longer and scarcely narrower than the fruit, the uppermost about as long as and the lowermost much longer than the fruit; perianth of 1 oval to rounded-oval posterior segment crenate or crenate-incised at apex; stamens 1–3; of these the posterior 1.5–2 times as long as the perianth; fruit oval or oblong-obovate, 2.5–3.5 mm long and 2–2.5 mm broad, with convex outer and flat or scarcely concave inner face, glabrous, somewhat lustrous, mostly verruculose, broadly triangular-tapering or rounded at summit; wings thin, yellowish, semitransparent, slightly crenate, one-tenth to one-fifth as broad as the darker olivaceous-brown kernel.

Riverside alluvia. — Centr. Asia: Pam.-Al. (Pamir). Endemic. Described from the Murgab District, from the Boguchi natural boundary area in the Ak-su River valley. Type in Tashkent.

27. *C. dutreuilii* Iljin in Acta Inst. Bot. Ac. Sc. URSS, 1 sér., 3 (1936).

Annual, 3–12 cm high, mostly prostrate-branched, with scattered hairs especially in the inflorescence; leaves linear to oblong, narrowing toward base, or mostly narrowly oblanceolate, commonly obtuse and mucronate, flat, gradually passing into bracts; inflorescence mostly slender and rather loose; bracts oblong to lanceolate, broadly scarious-margined, acuminate, slightly overlapping and covering the fruit; perianth mostly of 1 oblong-ovate to broad-oval incised segment, somewhat deeply bisected; stamen commonly 1, rarely 3, fruits borne in the axils of nearly all leaves and of the bracts, obovate, 3–4 mm long and 2–2.5 mm broad, mostly minutely pustulose, often laterally revolute, the outer surface of the rotund nutlet slightly caved in; wings yellowish, transparent on the margin, toothed-incised especially in upper part, gradually enlarged toward summit and here one-fifth to one-third as broad as the kernel, terminating in a dome-shaped beak. Fl. June; fr. July–August. (Plate VI, Figure 4).

Loess slopes and stony places. — Centr. Asia: Pam.-Al. (Pamir). Gen. distr.: Dzu.-Kash. Described from plants collected by Dutreuil de Rhins from Polour in Kashgaria. Type in Leningrad.

28. *C. papillosum* (O. Kze.) Iljin in Bull. Jard. Bot. Princ. USSR XXVIII, 5-6 (1929) 638. — *C. hyssoppifolium* var. *papillosum* O. Kze. in A. H. P. 1 (1887) 232. — *A. apterum* Korov. (pro parte) in Izv. Inst. Pochv. i Geob. SAGU 3 (1927) 149 (nomen). — Exs.: H. F. A. M., X, no. 232 (sub *C. lehmanniana*).

Annual, 3-30 cm high, bushy-branched from base, with scattered hairs; lower leaves oblanceolate, rounded at apex, gradually narrowing toward base, wilting in fruit, the others narrower, the upper sublinear, acuminate, gradually passing into bracts, of these the lower surpassing the fruit, the upper ones subovate and equaling or shorter than but always narrower than the fruit; perianth mostly of 1 segment; stamens mostly 3; fruit oval, 3-4 mm long and 2.25-3 mm broad, dull, minutely verrucose, light brown or reddish-brown, the outer face flat or very slightly buckled at the level of wing base, the inner face flat or slightly concave; wings yellowish, opaque, entire or in upper part obsoletely toothed with obtuse slanting teeth, one-twelfth to one-fourth as broad as the kernel, rounded or more often broadly triangular at summit. April-May. (Plate VII, Figure 6).

Sandy habitats, sandhills and barchan dunes; in groups. — Centr. Asia: Kyz. K., Kara K., Amu D. Endemic. Described from specimens collected by Androsov in the vicinity of Farab. Type in Leningrad.

29. *C. korovini* Iljin in Bull. Jard. Bot. Princ. XXVIII, 5-6 (1929) 641. — *C. apterum* Korov. (pro parte) in Izv. Inst. Pochv. i Geob. SAGU, 3 (1927) 149 (nomen).

156 Annual, 5-20 cm high, branched, with scattered hairs; lower leaves oblanceolate, narrowing toward base, the others linear, acute, gradually passing into bracts; inflorescence slender and rather loose; bracts lanceolate to linear or more rarely oblong-ovate, mostly longer than the fruit, toward summit of inflorescence as long as or scarcely shorter but always narrower than the fruit; perianth of 1 segment; stamens 1-3; fruit oval or somewhat obovate, 3-4 mm long and 2.25-3 mm broad, usually slightly transversely buckled at the middle on the convex outer face, concave at the back, stellate-hairy, rufous-brown, shortly broad-triangular at summit; wings entire or slightly and remotely denticulate, yellowish, opaque, one-tenth to one-fifth as broad as the kernel. April-May. (Plate VII, Figure 1).

Sandy steppes, sandhills, and pebbles covered with a thin layer of sand or gravel; in groups. — Centr. Asia: Balkh., Kyz. K., Kara K., Amu D. Endemic. Described from numerous specimens; the one to be considered as type originates from the sands around Chaudur southeast of the town of Karakul' (Uzbekistan). Type in Tashkent.

30. *C. gelidum* Iljin sp. nova in Addenda V, p. 663.

Annual, small, commonly 3-6 cm high, bushy-branched, with ascending lower branches, with scattered hairs especially on the bracts; leaves linear, acute, slightly narrowing toward the base, the lower spreading, the upper suberect; inflorescence short, compact; bracts oval (the lower ones oblong),

broadly white-membranous-margined, acute, the lower considerably and the upper slightly surpassing the fruit, the fruit margin exposed at least on one side; perianth of 1 posterior segment, this oval, toothed or toothed-emarginate at apex; stamens 3, the longer posterior stamen mostly twice the length of the perianth; fruit oval, 3–4 mm long and 1.75–2.75 mm broad, the convex outer face often with a bulge near the summit, the inner face concave, both sides hairy, the summit tapering to a beak; wings semi-transparent, lighter in color than the nutlet, toothed, distinctly hairy, one-sixth to one-third as broad as the kernel.

Eurotia associations on sands. — Centr. Asia: Pam.-Al. (Pamir). Endemic. Described from the Lake Rang-kul' area. Type in Tashkent.

31. *C. elongatum* Bge. in Maxim. Prim. fl. Amur. (1859) 224. — *C. sibiricum* subsp. *amurense* Iljin in Bull. Jard. Bot. Princ. de l'URSS XXVIII, 5–6 (1929) 650.

Annual, 20–50 cm high, almost completely glabrous except for scattered hairs on the young parts, branched from base; leaves linear to subfiliform, acuminate, flat; inflorescences mostly compact, oblong-ovaloid to strongly elongate; bracts mostly ovate to oblong-ovate, short- or long-acuminate, the lowest sublanceolate, all broadly scarious-margined, completely covering the fruit except often the lowermost; perianth of 1 posterior segment, this mostly oval, often with margin narrowly curved forward, usually notched at the middle; 2 small anterior-lateral segments often present; stamens 1–5, mostly 5, 1.5–2 times as long as the perianth; fruit oblong-oval or oblong-obovate, 3–4.5 mm long and 2.25–3.25 mm broad, very lustrous, rarely monochromatic, commonly variegated with dark speckles, slightly slanting-notched at summit containing short remnants of stigmas; wings in typical specimens broad, toothed. July–August. (Plate VI, Figure 15).

Alluvial sands. — Far East: Uss. Gen. distr.: Jap.-Ch. Described from several specimens, notably one from the village of Khungari on the Amur River. Type in Leningrad.

Note. In the cited publication Bunge describes several varieties based on the shape of leaves and bracts, but they are not of any great importance (*var. tenuifolium* Bge., *var. latifolium* Bge., *var. subimmarginatum* Bge., and *var. intermedium* Bge.). However, many specimens, notably those from the Suifun and Tumyn-gan rivers, differ from the type in having very narrow-winged fruits (*var. leptopterum* Iljin) and a more convex kernel, so that separation as a distinct species would be possible. Specimens from around Lake Khanka, with dull fruits, show closest resemblance to the original specimens of *C. stauntonii* Moq. described from China. At any rate, affinity between these species is so great that they call for further study. *C. sibiricum* subsp. *baicalense*, which I described in Bull. Jard. Bot. Princ. XXVIII, 5–6 (1929) 650, is also similar to *C. elongatum* Bge. and is distinguishable chiefly by its hairiness.

32. *C. confertum* Bge. in Maxim. Prim. fl. Amur. (1859) 225.

Annual, 10–30 cm high, hairy, branched from base, mostly purple in lower part; leaves narrowly linear, acuminate; inflorescences very dense, hairy; bracts closely imbricated, broad, suborbicular, broadly white-scarious-margined, short-tapering at summit to a recurved point, completely covering

the fruit, the lower ones long-acuminate; perianth of 1 segment; stamens 1-5, shorter than to as long as the perianth; fruit rotund or very broadly obovate, very rarely rounded-oval, 3-3.5 mm long and 2.75-3.5 mm broad, almost flat, greenish-yellow, monochromatic, winged, slightly and broadly emarginate at summit; wings one-half or more rarely one-third to three-fourths as broad as the kernel, transparent, entire or obsoletely toothed. July-August.

Sandy river flats. — Far East: Uss., Uda (?). Endemic. Described from the Amur River valley above the village of Sumtakho. Type in Leningrad.

33. *C. macrocarpum* Bge. in Maxim. Prim. fl. Amur (1859) 226. — *C. macrocarpum* Trautv. in A. H. P. IX (1884) 130.

Annual, 10-50 cm high, green, with scattered hairs, subsequently glabrate, leaves linear or more rarely linear-filiform, thickish, mostly arched-recurved; inflorescence claviform to oblong-claviform; lower bracts leaf-like, remote, narrower than the fruit, the others imbricated, broad-ovate, mostly completely covering the fruit; perianth of 1 segment, subquadrate, rarely of 3 segments; stamens 1-5; fruit broad-oval to subrotund or obovate-rotund, 4.5-6.25 mm long and 3.75-5.5 mm broad, flat or nearly so, notched at summit, naked, lustrous, dark olivaceous and commonly speckled, broad-winged; wings scarious, semitransparent, paler, denticulate, obsoletely hairy along the base line, one half to three-fourths as broad as the kernel. August. (Plate VI, Figure 7).

Riverside and maritime sands. — Far East: Uss., Uda. Endemic. Described from two specimens, collected from an island below Suchu in the lower reaches of the Amur River, and from the village of Adi, also on the Amur, respectively. Type in Leningrad.

34. *C. ulopterum* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 765.

Annual, 3-15 cm high, branched or more rarely simple, with scattered hairs; lowest leaves linear-filiform, subterete, the others narrowly linear, strongly divergent, thickish, flat or slightly involute; lower bracts leaflike, narrower than and many times as long as the fruit, the others ovate to suborbicular and mostly completely covering the fruit; perianth of 1 segment; stamens 1-3; fruit oval, 4-5.25 mm long and 2.75-4 mm broad, fleshy, transversely vesicular-rugose, stellate-pubescent; wings corrugated-undulate. (Plate VII, Figure 5).

E. Siberia: Confined to the surf zone of Lake Baikal. Type in Leningrad.

Genus 414. **AGRIOPHYLLUM** * M. B.

M. B. Fl. taur.-cauc. III (1819) 6; Ldb. Fl. Ross. III (1851) 755.

Flowers solitary in the axils of bracts, in capitate or oblong-ovaloid spiny glomerules borne singly in the axils of nearly all leaves; perianth of 1-5 scarious segments; stamens 1-5; ovary with 2 stigmas; fruit strongly flattened, opening in maturity at the front and at the back by means of scarious winglets, often terminating in a long 2-cleft or even 3-pronged beak; seeds oval, compressed, with semitransparent endosperm, the variegated margin containing the bulging embryo. Rigid spiny annuals, with alternate entire leaves. The genus contains 6 species.

* From Greek agrios, wild, and phyllon, leaf.

1. Leaves, at least the lowest, very broad, ovate to broad-ovate and then distinctly and abruptly petiolate, or elliptic, relatively large and sessile and then only 2 at the very base of the stem 2.
- + Leaves narrow, linear to oblong-linear or narrowly lanceolate, slightly narrowing toward base, sometimes without petiole 3.
- 159 2. Leaves ovate, petiolate, in large number on the stem; fruit hairy 5. *A. latifolium* Fisch. et Mey.
- + Two lowermost leaves elliptic, borne at the very base of the stem, all the others very small, spiniform, with dilated base; fruit naked 4. *A. palezkinum* Litw.
3. The beak of the fruit 2-cleft nearly to the base, each of the divergent divisions with a small lateral tooth at the summit 1. *A. arenarium* M. B.
- + The beak of the fruit with 3 toothless divisions 4.
4. The spreading lateral divisions of the beak mostly longer than the middle one; the upper margin of the very broadly winged fruit bearing a large toothed winglike outgrowth on each side 3. *A. minus* Fisch. et Mey.
- + The spreading lateral divisions of the beak mostly as long as but often shorter than the middle one; fruit narrowly winged or with barely perceptible winglike lateral outgrowths in upper part 2. *A. lateriflorum* (Lam.) Moq.

1. *A. arenarium* M. B. Fl. taur.-cauc. III (1819) 6; Fenzl in Ldb. Fl. Ross. III, 2, 756; Shmal'g., Fl. II, 362; Kryl., Fl. Zap. Sib. IV, 927; Il'in in Fl. Yugo-Vost. IV, 185. — *A. pungens* Link ex A. Dietr. Sp. pl. I (1831) 124. — *A. squarrosus* Moq. in DC. Prodr. XII, 2 (1849) 139. — *Corispermum pungens* Vahl, Enum. 1 (1805) 17. — *C. squarrosus* Pall. It. 1 (1771) 385 et auct. plur., non L. — Ic.: Fl. Yugo-Vost. IV (1930) 185, fig. 270.

Annual, 20–100 cm high, stiff, spiny, branched from the base, with scattered branched hairs; leaves lanceolate to linear, narrowing toward base, spiny-tipped; glomerules solitary in the axils of nearly all the leaves, spinous-bracted; perianth 1–3-lobed, toothed-incised; stamens 2 or 3; fruit naked, 3.5–5.5 mm long; each of the long spreading divisions of the 2-parted beak with a small lateral tooth near the summit; fruit margin mostly broad-winged, the wing margins erose-toothed; seeds oval to rounded-oval, 1.3–2 mm long and 1–1.75 mm broad. August–October. (Plate VII, Figure 7a–b).

Sands, mostly shifting and especially hummocky sands, also at the foot of barchan dunes; in groups. — European part: Transv. (Ural'sk area), L. Don (Kamyshin), L. V.; Caucasus: Cisc., Dag., E. Transc.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K. (N.) Gen. distr.: Dzu.-Kash., Mong. Described from the Caucasus. Type in Leningrad.

160 **Economic importance.** The plant provides good forage for camels and sheep, but only before flowering; suitable for ensilage; not edible at maturity because of the spininess of the fruits. Analysis of whole fruiting plants from West Kazakhstan (Adaevskii district) gave the following composition in percentages of air-dry weight: hygroscopic water 9.97, ash 9.93–11.03, cellulose 22.51–25.00, crude protein 5.52–6.13, albumin 5.34–5.93, crude fat 2.08–2.31, nitrogen-free extract 49.99–55.53, starch equivalent 33.91–37.67 (I. Larin). The plant is of considerable food value to nomads,

who use it as a bread substitute and as a mealy supplement to sour milk and who roast the seeds for food. Also used by the Russians in famine years. The seeds contain in percentages: protein compounds 16.36, fat 5.2, and carbohydrates 60; they provide 343 calories per 100 grams of available nutrients and thus compare favorably with wheat flour (344 cal.). The oil extracted from the seeds resembles sunflower oil in taste and sesame oil in composition (V. Nesmelov). A hectare may yield up to 30 kg of seed and about 2,000 kg of herbage (Zhugina and Salin). The plant can be recommended for cultivation on sandhills.

2. *A. lateriflorum* (Lam.) Moq. in DC. Prodr. XIII, 2 (1849) 139; Ldb. Fl. Ross. III, 756; Boiss., Fl. Or. IV, 928. — *A. tournefortii* Fisch. ex Trautv. in Bull. Soc. Nat. Mosc. XL, 3 (1867) 58. — *Eryngium lateriflorum* Lam. Encycl. meth. IV (1797) 726.

Annual, 10–40 cm high, mostly branched from the base and covered with branched hairs; leaves lanceolate to linear, scarcely narrowing toward base, sessile, gradually tapering to a point, borne over the entire length of the stem, horizontally spreading to slightly recurved; glomerules spherical-ovaloid to ovaloid, the bracts transformed into spines, in the axils of all leaves; flowers solitary, the perianth of 2 or 3 incised-toothed segments; fruit 4–6 mm long, the beak 3-parted, the lateral divisions mostly somewhat shorter than the 2-fid middle division, the wing narrow and mostly entire or in upper part with weak slightly toothed lobes; seeds oblong-oval or elliptic, 1.5–2 mm long and 0.8–1 mm broad, somewhat compressed, with prominent white or tawny embryo and semitransparent endosperm. May–July. (Plate VII, Figure 9).

Sandhills and blown sands, blown-out synclines; sometimes on loams. — Caucasus: S. Transc.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K. Gen. distr.: Armenia, Iran. Described from the East (in Oriente), probably from Tournefort's Armenian collections. Type in Paris.

Economic importance. Same uses as those described for the preceding species. Considered by I. Larin superior in economic value to other species of the genus.

161 3. *A. minus* Fisch. et Mey. in Bull. Soc. Nat. Mosc. XII (1839) 170; — Ldb., Fl. Ross. III, 2, 755; Boiss., Fl. Or. IV 928. — Exs.: HFR no. 582.

Annual, 5–40 cm high, slender, divaricately bushy-branched from the base, covered with branched hairs; leaves narrow, linear to linear-lanceolate, scarcely narrowing toward base, spiny-tipped; glomerules borne singly in the axils of all leaves, spiny by the firm pointed bracts; fruits 4–5 mm long, naked, with 3-parted beak; lateral divisions of the beak short-spreading, mostly longer than the middle one; fruit margin broad-winged especially in upper part, forming 2 incised-toothed narrowly decurrent lateral lobes; seed oval, 1.5–2 mm long and ca. 0.8–1 mm broad. May–August. (Plate VII, Figure 8). ;

Barchan dunes. — Centr. Asia: Kara K., Amu D. Gen. distr.: Iran. Described from Ogurchinskii Island in the Caspian Sea. Type in Leningrad.

Economic importance. Economic uses as those of the two preceding species. Analysis of entire fruiting plants from Ust-Urt gave the following percentage composition: water 9.16, ash 7.25–7.98, cellulose 14.75–16.24,

crude protein 11.58–12.75, albumin 10.00–10.04, crude fat 3.67–4.04, nitrogen-free extract 53.59–58.99, soluble carbohydrates 1.25–1.38 before and 7.48–8.23 after inversion, starch equivalent 39.75–43.76. It is possible that this analysis refers to the preceding species (I. Larin).

4. *A. paletzianum* Litw. in Trav. d. Mus. bot. Acad. St. Pétersb. VI (1909) 77. — Ic.: Paulsen, The Sec. Pamir Exp. (1912) f. 74. — Exs.: HFR no. 2419.

Annual, 5–20 cm high, densely branched from the base and bearing at the very base 2 relatively large elliptic leaves short-attenuate toward base; other leaves bracteal, small, tapering to a spiny point from a broad base, on the upper part of the stems spreading; perianth of 1 or 2 segments; stamens 3–5; fruit naked, ca. 3 mm long and 1.75 mm broad, long-beaked, the filiform divisions of the 2-parted beak erect or somewhat divergent, the enlarged wings in the upper part of the fruit fringed-incised; seeds elliptic, ca. 1–1.25 mm long. May–June. (Plate VII, Figure 10).

Sandy steppes and pebbly sands. — Centr. Asia: Kyz. K. (S.), Kara K., Amu D. Endemic. Described from the vicinity of Murgak railroad station. Type in Leningrad.

5. *A. latifolium* Fisch. et Mey. in Bull. Soc. Nat. Mosc. XII (1839) 170; Ldb. Fl. Ross. III, 2, 757; Boiss., Fl. Or. IV, 929. — Exs.: HFR no. 281; Edit. H. B. P. M. no. 63.

162

Annual, 15–50 cm high, divaricately branched from the base; leaves petiolate, ovate, rounded or more rarely subcordate at base, tapering to a point, in the typical form disappearing at the summit of inflorescence; glomerules in the axils of all leaves borne on projections of geniculate curved inflorescence branches; perianth mostly of 2 oval incised-toothed segments; fruit 4–6 mm long, with scattered hairs, produced into a rather long bifid beak, winged in upper part, the wings forming 2 lateral subentire lobes gradually and narrowly decurrent onto the beak; seeds oblong-oval or elliptic, 1.5–2 mm long. July–August. (Plate VII, Figure 11).

Sands, especially barchan dunes. — Centr. Asia: Kyz. K., Kara K., Mt. Turkmen., Amu D., Syr D., Pam.-Al. (W. part). Endemic. Described from Cheleken Island in the Caspian Sea. Type in Leningrad.

Genus 415. **ANTHOCHLAMYS***FENZL

Fenzl in Endlich, Gen. (1836) 300.

Flowers in a spiciform inflorescence, perfect, solitary, ebracteolate; perianth deeply 5-parted with 2-lobed oboblong segments; stamens 5, the oblong anthers with locules separated except for a narrow connective at the middle, terminating in a minutely tuberculate appendage; ovary pyriform, with 2 sessile or subsessile stigmas; fruit vertical, compressed, winged; seeds with endosperm and annular embryo. Annual plants. The genus contains 2 or 3 species.

1. The united divisions of the style (not stigmas!) forming a tubercle (though only a small one) at the summit of the fruit, often situated in the notch of the wing when present; floriferous part of the inflorescence elongated; bracts lanceolate, point-tipped
 1. *A. polygaloides* (Fisch. et Mey.) Fenzl.

* From Greek anthos, flower, and chlamys, cover.



PLATE VIII. 1. *Kalidium foliatum* (Pall.) Moq.: a) branch, b) flower, c) stamen, d) seed. — 2. *Halopeplis pygmaea* (Pall.) Bge.: a) general aspect, b) flower, c) stamen, d) seed. — 3. *Halostachys caspica* (Pall.) C.A.M.: a) branch, b) and c) flowers at different development stages, d) fruit. — 4. *Halocnemum strobilaceum* (Pall.) M.B.: a) branch, b) fragment of vegetative branchlet, c) flower analyzed, d) seed. — 5. *Salicornia herbacea* L.: a) general aspect, b) portion of inflorescence, c) flower, d) seed.

+ The short divisions of the style spreading and imbedded in the wings, closely following the wing margins and never forming a tubercle; floriferous part of inflorescence short, subcapitate, the fruits remotely disposed below; bracts oval, scarcely point-tipped 2. *A. turcomanica* Iljin.

65 1. *A. polygaloides* (Fisch. et Mey.) Fenzl, l. c.; Moq. Enum. Chenop. (1840) 102 et DC. Prodr. XIII, 2 (1849) 143; Fenzl in Ldb. Fl. Ross. III, 765; Boiss., Fl. Or. IV, 931. — *Corispermum polygaloides* Fisch. et Mey. Index sem. I (1835) 24. — Ic.: Jaub. et Spach Ill. III (1847–50) t. 299.

Annual, 10–50 cm high, erect or prostrate, branched from the base, glabrous except for short hairs in the inflorescence; lower leaves short-petioled, oval or oblong, the others narrower, attenuate toward base; inflorescence elongate, dense; perianth 1–2.5 mm long, free to below the middle; fruit rotund, 2–4 mm in diameter, with a broad and somewhat undulate wing, without apical notch (var. *caucasica* Iljin) or distinctly notched (var. *turkestanica* Iljin = *A. turkestanica* Iljin in herb.) (Plate VI, Figure 12), with a tubercle-shaped remnant of style. (Plate VI, Figure 14).

Limestone, pebble-and-sand stony slopes. — Caucasus: Tal.; Centr. Asia: Syr D. Gen. distr.: Iran. Described from Talysh (Kulenesov Mts. on the road to Suvant). Type in Leningrad.

2. *A. turcomanica* Iljin sp. nova in Addenda V, p. 663. — Exs.: HFR no. 583 (sub *A. polygaloides*).

Annual, 15–50 cm high, erect, glabrous except for short hairs in the inflorescence; lower leaves oval to oblong-oval, short-petioled, the others narrower; floriferous part of inflorescence abbreviated; perianth 1–1.5 mm long, the segments united in lower part; fruit rotund, 3–4 mm in diameter, with a broad undulate wing, always distinctly notched at summit, without a tuberclelike body in the notch. (Plate VII, Figure 13).

Clayey and gravelly slopes, and rocks. — Centr. Asia: Mtn. Turkm. Endemic. Described from the Malyi Balkhan Range. Type in Leningrad.

Tribe 8. *SALICORNIEAE* Dum. Fl. Belg. (1872) 23; C. A. M. in Ldb. Fl. Alt. I (1829) 371. — Flowers perfect, more rarely with an intermixture of some pistillate ones, commonly in a short 3-flowered dichasium and mostly immersed in the tissue of the inflorescence axis; perianth 3- or 4-merous, commonly united to the summit, herbaceous or scarious; stamens 1 or 2; seeds vertical, with annular or arching embryo. Annuals or shrubs with succulent and jointed shoots, often completely leafless, or leaves reduced to scales, opposite or alternate.

66 Genus 416. **KALIDIUM** * MOQ.
Moq. in DC. Prodr. XIII, 2 (1849) 146.

Flowers perfect, mostly in spikelets of 3 in the axils of scalelike bracts, ebracteolate; perianth of 4 segments, united nearly to the summit, scutellate

* Apparently, alluding to the potash content of the plants.

at the top; stamens 2, with 2 short unappendaged anthers; ovary with 2 subsessile papillose stigmas; fruit vertical with densely short-papillose perianth; seeds flattened, with horseshoe-shaped embryo and central endosperm. Undershrubs with small alternate often obsolescent fleshy decurrent leaves. The genus contains 4 species.

1. Leaf blade relatively well developed, sublinear-cylindric, 2—4 mm long, spreading 1. *K. foliatum* (Pall.) Moq.
- + Leaf blade undeveloped, reduced to a tuberclelike rudiment 2.
2. A graceful plant, usually not more than 20—25 cm high, with numerous prostrate stems; leaves sheathing, ocreately enlarged at the end and alternately spreading in opposite direction, narrowing toward base, hence the young branchlets slenderly catenulate; leaf blade tubercle-tipped 3. *K. schrenkianum* Bge.
- + Plants varying in height, often up to 70 cm; leaves on youngest branchlets subcylindrically sheathing, not narrowing or scarcely narrowing toward base and closely contiguous, thus the branchlets merely distinctly jointed and catenulate in appearance with transverse constrictions. 2. *K. caspicum* (L.) Ung.-Sternb.

1. *K. foliatum* (Pall.) Moq. in DC. Prodr. XIII, 2 (1849) 147; Fenzl in Ldb. Fl. Ross. III, 2, 770; Shmal'g., Fl. II, 377; Il'in in Fl. Yugo-Vost. IV, 186; Kryl., Fl. Zap. Sib. IV, 928. — *Salicornia foliata* Pall. It. I (1771) 422 et app. 482. — *Halocnemum foliatum* Spreng. Syst. veget. 1 (1825) 19. — Ic.: Pall. Illustr. (1803) t. V et VI; Fl. Yugo-Vost. IV (1830) 186, fig. 271.

A small undershrub, 10—75 cm high, much branched, with light-colored brittle wood and whitish annotinous shoots, sometimes very depressed and compactly caespitose and then with very small crowded leaves

167

(f. *glomeratum* Fenzl, l. c.); leaves linear (f. *longifolium* Fenzl, l. c.) or in dwarf forms shorter and subovate (f. *brevifolium* Fenzl, l. c.), glaucous, glabrous, thick and succulent, convex beneath, broadly triangular at summit, subacute and mostly somewhat inflexed at the tip, sessile, half-clasping and decurrent on the stem as an adnate sheath; spikelets mostly elongate-cylindric or in dwarf forms even ovate, sessile, divergent; fruiting perianth 4- or mostly 5-angled, navicular below and slightly raised at center; fruit mostly rotund, ca. 1 mm in diameter, reddish-brown, at one of the margins commonly truncate; seeds smooth. July—August. (Plate VIII, Figure 1 a—d).

Solonchaks, salinas, and takyr; often occupying extensive areas. — European part: L. V.; Caucasus: Cisc., Dag., E. Transc.; W. Siberia: U. Tob., Irt.; E. Siberia: Ang.-Say, Dau.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K. (N.). Gen. distr.: Dzu.-Kash., Mong. Described from vicinity of Gur'ev. Type in London.

Economic importance. Used for extraction of potash and soda. According to I. Larin, the plant provides poor forage; it is eaten by camels, sheep, and goats, only in late fall and in winter.

2. *K. caspicum* (L.) Ung.-Sternb. in Atti Contr. B. Firenze 1874 (1876) 317; Shmal'g., Fl. II, 376; Il'in in Fl. Yugo-Vost. IV, 187; Kryl., Fl. Zap. Sib. IV, 329. — *Salicornia caspia* L. Sp. pl. (1753) 4. — *S. arabica*

Pall. It. (1771) 412 et app. 481, non L. — *S. pallasii* C. A. M. in Hoh. Enum. Talsch (1838) 125. — *Halocnemum arabicum* Spreng. Syst. Veget. 1 (1825) 19. — *H. caspicum* Tausch, Flora XV, 2 (1832) 737, non L. — *K. arabicum* α *imbricatum* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 769. — Ic.: Engler u. Prantl. Pflanzenf. III, 1a, 75; Acta Univ. As. Med. Ser. VIII-b, 21, tab. 14 (sub *K. foliato*). — Exs.: Pl. or. exs. no. 277.

Undershrub, 15–75 cm high, with brittle woody stems, much branched; annotinous shoots glabrous, often whitish; leaves rudimentary, fleshy and succulent, glabrous, reduced to a very short pointed tubercle, convex beneath, rather flat above, decurrent as half-clasping sheaths adnate to stem, on young branchlets approximate and clasping on all sides, hence the branchlets apparently jointed; spikelets cylindric to ovaloid or more rarely linear and then helicoid, sessile, spreading, the lowermost sometimes peduncled; perianth as in the preceding species; fruit rounded-oval, 1.25–1.5 mm long; seeds naked and smooth. July–August.

Solonchaks, salinas, and takyrs; in groups or scattered. — European part: L. V.; Caucasus: Cisc., Dag., E. and S. Transc.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kara K. (Atrek River), Kyz. K., Syr D., T. Sh., Pam.-Al. (in the last two regions only sporadically). Gen. distr.: Iran. Described from the Caucasian coast of the Caspian Sea. Type in London (?).

Economic importance. The plant is used as a source of potash and soda. According to I. Larin, it is not eaten by any kind of livestock. Analysis of plants from the Talas-Susamyr District of the Kirghiz ASSR gave the following percentage composition for the end of September and beginning of November, respectively: hygroscopic water 4.69, 4.22; ash 30.53, 42.53, cellulose, 11.80, 15.25, crude protein 8.35, 6.68; crude fat 3.89, 3.33, nitrogen-free extract 40.74, 27.90 (Abolin and Sovetkina). An extract of this plant supplemented with green soap has a toxic effect on plant pests (M. Kotov and others). The plant has ornamental value.

3. *K. schrenkianum* Bge. ex Ung.-Sternb. Verzeichn. Syst. Salicorn. (1874) 95; Kryl., Fl. Zap. Sib. IV, 930. — *K. arabicum* β *remotiflorum* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 770.

A small undershrub, 10–25 cm high, divaricately branched from the base; annotinous shoots numerous, arising very abruptly from the short old stem, this densely covered at the end with fragments of old woody branches; young branches of the first order whitish, slender, apparently moniliform due to constrictions formed by the leaves; leaves succulent, reduced to a divergent fleshy tubercle, rounded on the back, very slightly concave on the upper surface, obtuse or minutely apiculate, half-clasping and decurrent between the oppositely directed foliar tubercles, the catenulate appearance of the branchlets thus created being a distinguishing feature of this species; spikelets oblong or more often ovaloid to subglobose, sessile, declinate, mostly borne on the geniculate projections of the inflorescence axis; perianth as in other species, but much smaller; fruit subrotund or ovate, flattened, reddish-brown, densely papillose, small, 0.75–1 mm long. June–August.

Puffy solonchaks, gypsiferous Tertiary clays, and shores of brackish lakes. — Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from the shores of Lake Ala-kul'. Type in Leningrad.

Economic importance. The plant can be used for potash extraction.

Genus 417. **HALOPEPLIS** * BGE.

Bge. in *Linnaea* XXVIII (1856) 573.

Flowers perfect; perianth 3-merous, the segments almost fully united, forming a compact spiciform inflorescence; stamens 1 or 2; pistil with vertical ovary and 2 stigmas. Succulent annual and perennial plants with alternate leaves. The genus contains 3 species.

- 169 *H. pygmaea* (Pall.) Bge. in Ung.-Sternb. System. Salicorn. (1866) 105; Il'in in Fl. Yugo-Vost. IV, 188. — *Salicornia pygmaea* Pall. Illustr. (1803) 8. — *S. herbaceae* γ *pygmaea* Moq. Chenop. (1840) 115; Fenzl in Ldb. Fl. Ross. III, 2, 768. — *Halostachys soongorica* C. A. M. in Bull. phys.-math. de l'Acad. d. St. Pétersb. I (1843) 371; Fenzl in Ldb. Fl. Ross. III, 2, 771. — *Halopeplis songorica* Bge., l. c. — Ic.: Pall., l. c., t. II, fig. 2; Fl. Yugo-Vost. IV (1930) 188, fig. 272; Korovin, Rast. Sr. Az., fig. 59. — Exs.: H. F. A. M. no. 110.

A small annual, 3–20 cm high, glaucous, glabrous, mostly branched; leaves fleshy, succulent, with subglobose and thickly rounded blade, sessile, clasping as decurrent sheath; inflorescences spiciform, sessile; bracts broadly semiterete, their free margin strongly decurrent; flowers mostly in 3's in the axils of fleshy bracteal scales; perianth flat at the top, scutellate with an opening at the middle, narrowing below and adnate to the axis of the spikelet; stamen mostly 1, exerted together with the stigmas; seeds small, ovate or oval, 0.5–1 mm in diameter, densely papillose, scarcely capitately thickened at the top. July – September. (Plate VIII, Figure 2 a–d).

Seacoasts, salinas, and takyrs. A rare plant, solitary or in groups. — European part: (?) L. V.; Caucasus: Cisc. (Kuma); Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D., Amu D. (Novaya Bukhara [Kagan]), Mtn. Turkm. (Badkhyz). Endemic. Described from the shores of the Caspian Sea near the Kuma River. Type in London.

Genus 418. **HALOSTACHYS** ** C. A. M.

C. A. M. in Bull. phys.-math. d. l'Acad. d. St. Petersb. I (1843) 361.

Flowers perfect, 3-merous, ebracteolate; perianth segments united; stamen 1, anterior; pistil with notched stigmas. Shrubs with jointed almost leafless stems and opposite scalelike leaves and branches. A monotypic genus.

H. caspica (Pall.) C. A. M. in Bull. Soc. Nat. Mosc. XI (1838) 361; Shmal'g., Fl. II, 377; Il'in in Fl. Yugo-Vost. IV, 191; Kryl., Fl. Zap. Sib. IV, 930. — *Salicornia caspica* Pall. It. I (1771) 431; Illustr. (1803) 12 (exclus.

* From the Greek words *hals*, salt, and *peplis*, name of a plant of the family Lythraceae.

** From the Greek words *hals*, salt, and *stachys*, spike.

icon.). — *Halocnemum caspicum* M. B. Fl. taur.-cauc. III (1819) 3; Fenzl in Ldb. Fl. Ross. III, 2, 772. — *Halimocnemum caspium* Goeb. Reise in d. Stepp. d. südl. Russ. II (1838) 126. — *Arthrocnemum caspicum* Moq. in DC. Prodr. XIII, 2 (1849) 150. — Ic.: Fl. Yugo-Vost. IV, fig. 273. — Exs.: HFR no. 527; H. F. A. M. no. 111.

70

Shrub or small tree to 350 cm high; stem much branched, almost leafless; annotinous shoots glaucous, succulent, terete, jointed, glabrous and mostly muricate or more rarely almost smooth; leaves scalelike, slantingly triangular at apex and mostly acute, each forming a somewhat divergent band around the stem by fusion with the scale opposite; inflorescences spiciform, opposite, borne on jointed peduncles; flowers in 3's subtended by short scutellate scalelike bracts; perianth fleshy, 3-lobed only at summit, inflated and distinctly 3-angled in fruit, persistent; seeds small, naked, ovate to oblong-ovate, ca. 0.75 mm long. July–September. (Plate VIII, Figure 3a–d).

Wet, preferably puffy solonchaks, mostly in river valleys and on seacoasts; scattered or in groups, often covering considerable areas. — European part: L. V. (rare); Caucasus: Dag., S. and E. Transc.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D., Amu D., Kara K., Pam.-Al. (along the Panj River, etc.). Gen. distr.: Iran., Mong., Dzu.-Kash. Described from the vicinity of Gur'ev. Type in London.

Note. Mayer, in Hohenacker's publication, reported this genus at first under the specific name *H. caspica* C. A. M. (1931) and only in 1943 gave the description of this genus; this accounts for the earlier dating of the generic citation as compared with that given for the species.

Economic importance. The plant is used for fuel. According to I. Larin, it provides fodder of inferior quality and is only eaten in winter by camels, sheep, and goats. It is used for potash extraction. Analysis of air-dry young plants from the vicinity of Gur'ev gave the following percentage composition: ash 22.9, of which 70.25 water-soluble salts, including K_2SO_4 5.6121, NaCl 22.6889, Na_2CO_3 36.7953, free sodium bicarbonate 2.5061 (Goebel). Abolin and Sovetkina reported the following percentage composition for September plants from the Talas-Susamyr District of the Kirghiz ASSR: hygroscopic water 6.30, ash 36.54, cellulose 12.50, crude protein 14.19, crude fat 3.47, nitrogen-free extract 27.03. According to M. Kotov, the plant contains toxic substances and its action upon incorporation of green soap compares favorably with that of anabasin. An ornamental plant.

Genus 419. **HALOCNEMUM*** M. B.

M. B. Fl. taur.-cauc. III (1819) 3.

Flowers perfect; perianth claviform, 3-lobed; stamen 1, anterior; pistil vertical, with 2 subulate stigmas; bracteoles none; the flowers mostly in 3's, rarely in pairs, subtended by a scalelike bract, somewhat immersed in the axis of the inflorescence. Subshrubs or shrubs with obsolete leaves and succulent annotinous shoots. A monotypic genus.

* From Greek *hals*, salt, and *cnemis*, sheath.

- 171 1. *H. strobilaceum* (Pall.) M. B. Fl. taur.-cauc. III (1819) 3; Fenzl in Ldb. Fl. Ross. III, 2, 773; Shmal'g., Fl. II, 377; Il'in in Fl. Yugo-Vost. IV, 188; Kryl., Fl. Zap. Sib. IV, 931. — *Salicornia strobilacea* Pall. It. I (1771) 412, 431. — *Halopeplis strobilacea* Cesati, Pass. et Gib. Comp. Fl. It. (1874) 271. — Ic.: Pall. Illustr. (1803) t. 4; Fl. Yugo-Vost. IV, fig. 274; Acta Univ. As. Med. Ser. VIII-b, 21, fig. 13; Korovin, Rast. Sr. Az., fig. 58; Journ. Bot. de l'USSR, 21, 5.

Undershrub or small shrub, forming rounded clumps or mounts in salinas and on takyrs; branches thick, prostrate, ramified, and mostly abbreviated; annotinous shoots terete, succulent, jointed, with short cylindric to subclavate joints and opposite sterile globular buds, these remaining long undeveloped or giving rise to abbreviated opposite flowering branchlets; leaves reduced to opposite obtusely angled subscutellate scales; perianth segments united only in lower part, oblong, whitish, connivent at summit, one of them flattish, the two lateral ones gibbous on the back; seeds vertical, oval or ovate, 0.5—0.75 mm long, flattened, the margin pustulose. August—October. (Plate VIII, Figure 4 a—d).

Salinas, takyrs, puffy solonchaks, and seacoasts; occurring in large numbers, usually forming dense thickets over considerable areas. — European part: Bl., Crim., L. Don (S. part), L. V.; Caucasus: Cisc., Dag., S. and E. Transc.; W. Siberia: U. Tob. (S. part), Irt. (S. part): Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D., Amu D., Kara K. Gen. distr.: Med., Bal.-As. Min., Arabia, Arm.-Kurd., Iran., Dzu.-Kash. Described from the northern Caspian area. Type in London.

Economic importance. According to I. Larin, the plant is of little forage value; it is eaten chiefly by camels, only in late fall. Agababyan, Granitov, and Kasimenko maintain that it provides fattening feed for these animals. According to Rollov, the plant is sometimes eaten by sheep during a severe winter. Plants from West Kazakhstan analyzed toward the end of the flowering period (1 August) show the following percentage composition: hygroscopic water 6.59, ash 28.87—30.91, cellulose 12.40—13.27, crude protein 14.88—15.93, crude fat 3.76—4.03, nitrogen-free extract 33.50—35.86, starch equivalent 27.08—30.81. The plant is used as a source of potash. Nomadic tribes use it for fuel (I. Larin). It contains substances toxic to plant pests, especially when applied in solution with soft soap (M. Kotov et al.). Recommended for ornament.

172 Genus 420. **SALICORNIA*** L.

L. Gen. pl. ed. 1 (1737) 357; Sp. pl. ed. 1 (1753) 3 (p.p.); Moq. Chenop. enum. (1840) 113.

Flowers mostly perfect; perianth entire and undivided, with but a narrow slit at the top; stamens 1 or 2; pistil with 2 stigmas; bracteoles none; flowers mostly in 3's, immersed in the stem tissue, in a succulent spiciform inflorescence; seeds covered with hooked hairs; embryo horseshoe-shaped. Annuals and undershrubs with rudimentary opposite leaves and succulent jointed stems. The genus contains about 30 species.

* From the French name of this plant, salicorne or salicor.

1. *S. herbacea* L. Sp. pl. ed. 2 (1762) 5; Turcz., Fl. baic.-dah. II, 39; Shmal'g., Fl. II, 377; Il'in in Fl. Yugo-Vost. IV, 191; Kryl., Fl. Zap. Sib. IV, 932. — *S. europaea herbacea* L. Sp. pl. (1753) 3. — *S. acetaria* Pall. Illustr. (1803) 7. — *S. herbacea* α *acetaria* Moq. Chenop. enum. (1840) 114. — *S. stricta* Willd. in Steud. Nom. ed. I (1821) 714. — *S. perennans* Willd. Sp. pl. I (1797) 24. — *S. prostrata* Pall., l. c., p. 8. — *S. herbacea* var. *pachystachya* Koch, Syn. fl. Germ. ed. 2 (1844) 693. — *S. herbacea* α *leptostachya* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 767. — Ic.: Pall., l. c., t. I, f. 1 and 2, t. II, fig. 1 and t. III; Fl. Yugo-Vost. IV (1930) 192, fig. 275; Korovin, Rast. Sr. Azii, fig. 63. — Exs.: H. F. A. M. no. 113.

Annual, mostly herbaceous with opposite branches, erect (f. *stricta* (Willd.) G. F. W. Meyer Hannöv. Magaz. (1824) 178), or with long prostrate branches (f. *prostrata* (Pall.) Moq., l. c.), jointed, succulent, glabrous, often turning red; leaves obsolescent, reduced to short sheaths; inflorescences spiciform, short-peduncled; flowers in dichasia of 3, the upper one often somewhat larger, the middle one borne slightly above the lateral ones, the three together forming a triangular cluster; perianth with obtusely angled margin, rhombic-scutellate, the stamens and stigmas protruding from the apical aperture. June—August. (Plate VIII, Figure 5a—d).

Wet solonchaks, salinas, and seacoasts; forming large thickets. — Arctic: Arc. Eur. (Kanin); European part: Dv.-Pech. (Solovetskie Islands, Arkhangel'sk), M. Dnp., V.-Don, Bl., Crim., L. Don, Transv., L. V.; Caucasus: Cisc., Dag., S. and E. Transc.; W. Siberia: Ob (S. part: Tyumen, the Ishim and Turinsk areas, etc.), U. Tob., Irt.; E. Siberia: Ang.-Say. (steppe islands), Dau.; Far East: Uss. (S. part of the coast); Centr. Asia: all regions except mountainous T. Sh., Pam.-Al., and Dzu.-Kash. Gen. distr.: throughout Europe, As. Min., Iran., India, Middle Asia, N. and S. Africa, America. Described from Europe. Type in London.

Economic importance. This plant is of interest in various respects even though it has not received due attention in the USSR. The plant was probably used in the past and is still in use at present as a source of soda. It contains the enzyme saccharase and a large number of alkaline oxalic salts. Analysis of October plants made in Germany gave the following percentage composition: water 76.58, ash 5.02 and 21.42 for fresh and dry weight, respectively; the mineral composition per hundred parts was 22.97 Na, 9.53 K, 4.85 Mg, 2.99 Ca, 27 Cl, 15.5 SO₄, 12 CO₃ and SiO₃. According to another German analysis, the ash contained 74.6% sodium chloride (NaCl), 2.3% magnesium bromide (MgBr₂), and traces of magnesium iodide (MgI₂). The plant thus appears to contain some valuable mineral constituents (Wehmer). Analysis of old specimens from the Caspian region showed the ash content to be 16.5% of air-dry weight, of this 75.5% soluble salts composed of 4.827 g K₂SO₄, 4.3128 Na₂SO₄, 51.8170 NaCl, and 6.4739 Na₂CO₃ (Goebel). The salt composition most probably fluctuates greatly in relation to the nature of soil salinity. Analysis of September plants from the Talas-Susamyr District of the Kirghiz ASSR gave the following percentage composition: hygroscopic water 6.24, ash 36.16, cellulose 13.77, crude protein 6.03, crude fat 2.63, nitrogen-free extract 35.17 (Abolin and Sovetkina). Glasswort is of considerable culinary importance in France, where it figures prominently in various sophisticated recipes. According

to French data, 100 grams of boiled glasswort yield 20.53 effective calories as against only 19.24 for bean herbage. Considering the enormous thickets of this plant on solonchaks of USSR steppes and deserts, we might, with proper utilization, be in possession of a rich source of a new and apparently edible vegetable. According to I. Larin, the plant is of no value as forage, being eaten only by camels in late fall and winter. Rollov reports that glasswort is eaten readily enough by sheep and that it induces fattening in these animals. The plant is sometimes used in popular medicine for its antiscorbutic and diuretic properties.

Subfamily 2. **SPIROLOBEAE** C. A. M. in Ldb. F. Alt. I (1829) 370. — Embryo spirally coiled; endosperm undeveloped.

Tribe 9. **SUAEDEAE** Rchb. Nom. (1841) 165. — Flowers perfect, mostly intermixed with pistillate ones, 5-merous; perianth changing, commonly succulent; bracteoles small, scarious, pellucid; seeds horizontal or vertical, flat on both sides, with spiral embryo. Succulent annuals or shrubs.

74 Genus 421. **SUAEDA*** FORSK.
Forsk. Fl. Aeg.-Arab. (1775) 69, t. 18.

Flowers perfect, intermixed with a considerable number of pistillate flowers by abortion of stamens, gathered in glomerules of 3 to many in the axils of bracts, laterally subtended by small scarious pellucid bracteoles; perianth of 5 segments, herbaceous, mostly succulent; segments free or united to the middle, often vertically or horizontally winged-appendaged and not infrequently hooded in fruit; stamens 5, with unappendaged anthers; ovary with 2 or 3 stigmas; fruit vertical or horizontal, both orientations often occurring in the same plant; pericarp scarious; heterocarpny common, most species developing two types of seed, those produced in summer and early fall with blackish-brown corky testa, those produced in late fall with thin scarious pale dull testa and prominent embryo. Glabrous and commonly fleshy annuals or undershrubs, with entire and mostly narrow succulent leaves. The genus contains about 100 species.

- | | |
|---|-----------------------------------|
| 1. Clusters borne on the petiole at some distance from the leaf axil
(Section 1. <i>Schanginia</i> (C. A. M.) Iljin) | 2. |
| + Clusters borne directly in the leaf axil | 6. |
| 2. Glaucous undershrub with small short leaves | 4. <i>S. microphylla</i> Pall. |
| + Annual plants | 3. |
| 3. Leaves filiform, terete; seeds smooth, lustrous | 5. <i>S. altissima</i> (L.) Pall. |
| + Leaves linear, flat; seeds with distinctly granular testa | 4. |

* From *Sûwêd mullât*, Arabic name of *Suaeda baccata*, meaning either blackish or salty.

4. All fruits vertical; seeds prominently granular. Central Asia 5.
- + Fruits vertical or horizontal; seeds applanately granular. East Siberia and the Far East 3. *S. glauca* Bge.
5. Leaves on the lower part of the stem longer, the upper ones in the paniculate inflorescence smaller, hence the plant apparently leafy only in its lower half; flowers several in a cluster. Central Asia and S. Kazakhstan ? 2. *S. paradoxa* Bge.
- + Leaves on all parts of the stem almost equal, hence the plant appearing leafy throughout; flowers solitary or in pairs. Kazakhstan 1. *S. linifolia* Pall.
6. Seeds blackish-brown or brown, rather strongly flattened, distinctly reticulate 7.
- + Seeds black, strongly convex, very glossy, smooth, with or without sculpturing visible under strong magnification 17.
7. Shrubs or undershrubs 8.
- + Annuals (Section 3. *Heterosperma* Iljin) 9.
8. Leaves 15—30 mm long; fruiting perianth always inflated (Section 4. *Physophora* Iljin) 18. *S. physophora* Pall.
- + Leaves 5—15 mm long; perianth unchanged in fruit (Section 2. *Lachnoistigma* Iljin) 6. *S. dendroides* (C. A. M.) Moq.
9. Segments of fruiting perianth banded with transverse winglike outgrowths 10.
- + Segments of fruiting perianth without winglike outgrowths 11.
10. Leaves broad, oval to oblong; perianth fleshy, 2.5—3.5 mm in diameter 27. *S. kossinskyi* Iljin.
- + Leaves filiform, semiterete; flowers smaller 26. *S. heterophylla* (Kar. et Kir.) Bge.
11. Fruiting perianth with unequal corniculate outgrowths 12.
- + Fruiting perianth unchanged or its segments but slightly and regularly modified, stellately disposed 13.
12. Conspicuously glaucous plants; leaves falcately upcurved, obtuse; seeds finely and inconspicuously reticulate. S. Uzbekistan 25. *S. drepanophylla* Litw.
- + Mostly dark green plants; leaves not falcately upcurved; seeds prominently reticulate. Siberia and Kazakhstan 24. *S. corniculata* (C. A. M.) Bge.
13. Seeds obscurely reticulate 14.
- + Seeds prominently reticulate 15.
14. Glaucous-green plants, subsequently turning yellowish to reddish; leaves filiform, semiterete, at least the upper ones acute. Ussuri 20. *S. ussuriensis* Iljin.
- + Conspicuously glaucous plants; leaves obtuse, apparently canaliculate by involute margins. Central Asia and the Caucasus 19. *S. salsa* (L.) Pall.
15. Small, glaucous plants, prostrate or ascending; leaves oblong to oval. Pamir 23. *S. olufsenii* Pauls.
- + Larger plants; leaves linear-filiform, semiterete 16.
16. Plants mostly small, simple or with elongated branches in lower part; inflorescence unbranched; bracts 2 to several times as long as the flowers, subappressed. Baltic coast 21. *S. maritima* (L.) Dumort.

- + Plants branched mostly from the base; inflorescence branched; bracts more or less divergent, shorter, as long as or barely surpassing the flower clusters. Everywhere except the Baltic coast 22. *S. prostrata* Pall.
17. Erect and rather tall plants; leaves filiform, subterete; fruiting perianth somewhat inflated, spongy-fleshy; seeds mostly vertical; stigmas thickish, shaggy with long hairs. Central Asia (Section 2. *Lachnostigma* Iljin) 7. *S. arcuata* Bge.
- + Fruiting perianth mostly not inflated (see, however, *S. baccifera* Pall.), never spongy-fleshy (Section 3. *Conosperma* Iljin) 18.
18. Plants 75—150 cm high; leaves linear, flat, 10—40 mm long and 2—3 mm broad 19.
- + Much lower plants; leaves shorter and narrower 20.
19. Leaves acute or acuminate, subremote; bracts 2—3 times as long as the clusters; largest flower ca. 3 mm in diameter. Lake El'ton 16. *S. eltonica* Iljin.
- + Leaves obtuse, those on the short branches closely approximate; bracts equaling to slightly surpassing or shorter than the clusters; largest flower ca. 2 mm in diameter. Uzbekistan 17. *S. turkestanica* Litw.
20. Fruit appearing already in May or June; arenarious plants, mostly in *Haloxylon* communities 21.
- + Fruits not ripening before August 22.
21. Leaves linear-filiform, often flexuous 8. *S. lipskyi* Litw.
- + Leaves oblong-spatulate or oblanceolate 9. *S. pygmaea* (Kar. et Kir.) Iljin.
22. Fruiting perianth strongly baccately inflated, acquiring in fall a rosy hue 11. *S. baccifera* Pall.
- + Perianth green, not berrylike 23.
23. Leaves obtuse, often terminating in a caducous bristle 24.
- + Leaves acute or acuminate 26.
24. Fruiting perianth of the middle axillary flower bearing an oblong membranous winglike keel, the lateral flowers sometimes with winglike transversal outgrowths; leaves oblong-linear. Lake Balkhash area 13. *S. pterantha* (Kar. et Kir.) Bge.
- + Membranous winglike keel absent 25.
25. Leaves mostly oval or oblong-obovate, flat except for the slightly convex underside, terminating, especially the younger ones, in a prominent frequently caducous bristle; cauline leaves subappressed 15. *S. microsperma* (C. A. M.) Fenzl.
- + Leaves oblong-linear, convex beneath, more or less concave above, not bristle-tipped and not appressed . . . 14. *S. transoxana* (Bge.) Boiss.
26. Plants mostly bushy-branched from the base; inflorescences rather compact; bracts several times as long as the flower clusters and commonly appressed to the inflorescence; stigmas more than 1 mm long. Caucasus, Europe, W. Kazakhstan 10. *S. confusa* Iljin.
- + Plants mostly erect; inflorescences scattered; bracts equaling or at most 1.5—2 times as long as the clusters, more or less divergent; stigmas mostly not more than 0.5—0.75 mm long. E. Kazakhstan 12. *S. acuminata* (C. A. M.) Moq.

Section 1. *SCHANGINIA* (C. A. M.) Iljin (non Volk.) in *Sovietskaja Botanica*, 5 (1936) *Schanginia* C. A. M. in Ldb. *Fl. Alt.* I (1829) 394, as genus. — Section *Salsina* Moq. *Enum.* (1840) 121 (p. p.); Asch. et Gr. *Syn.* V (1913) 193 (p. p.). — Section *Chenopodina* Moq., l. c., 124 (p. p.). — *Schanginia* Moq. in DC. *Prodr.* XIII, 2 (1849) 153 (p. p.); Fenzl in Ldb. *Fl. Ross.* III, 774 (p. p.), as genus. — *Suaeda* Moq., l. c., 155 (p. p.); Fenzl, l. c., 777 (p. p.), as genus *Chenopodina* Moq., l. c., 159 (p. p.), as genus. — *Helicilla* Moq., l. c., 169, as genus. — Section *Eusuaeda* Gr. et Godr. *Fl. France* III (1855) 29 (p. p.); Volkens in Engl. und Prantl, *Pflanzenfam.* III, 1a, 80. — Flower clusters borne on the petiole at some distance from the axil; seeds mostly vertical, often intermixed with horizontal, or the latter sometimes predominant.

Subsection 1. *SPERMACOCCA* Iljin. — Seeds distinctly, often prominently granular.

1. *S. linifolia* Pall. *Illustr.* (1803) 47; Kryl., *Fl. Zap. Sib.* IV, 942; Il'in in *Fl. Yugo-Vost.* IV, 202. — *Schanginia linifolia* C. A. M. in Ldb. *Fl. Alt.* IV (1833) 395; Fenzl in Ldb. *Fl. Ross.* III, 2 (1851) 775, non C. A. M. — *Chenopodium linifolium* Schult. *Syst. Veg.* VI (1820) 271. — *Suaeda nderiensis* Volkens in Engl. u. Prantl, *Pflanzenfam.* III, 1a (1893) 80. — *Schanginia nderiensis* Bge. *Reliq. Lehm.* (1851) 460. — Ic.: Pall., l. c., t. 40; *Fl. Yugo-Vost.*, fig. 280.

Annual, 10–75 cm high, erect, mostly branched, more rarely only in the inflorescence; leaves linear, flat, acute, narrowing toward base, somewhat fleshy, subappressed to the stem; flowers on the middle part of the stem borne on the petioles mostly in pairs, those on the upper part of the stem 1–3 together, disposed in almost leafless racemiform arched-recurved inflorescences, perfect and pistillate; perianth oblong, fleshy; segments hoodlike, connivent, to one-third the length of the perianth, in pistillate flowers almost completely united; fruiting perianth pyriform or obovoid; ovary with 2 or 3 very short stigmas; fruit vertical; seeds of two kinds, the precocious obovate, convex, black, distinctly and finely granular, 1.75–2 mm long and 1.5 mm in diameter, the later ones strongly compressed laterally, smooth, olivaceous or brownish-green, 1.75–2.25 mm in diameter. June–October. (Plate IX, Figure 2).

Solonchaks; in groups. — European part: L. V.; W. Siberia: U. Tob. (S.), Irt. (S.), Alt. (SW); Centr. Asia: Ar.-Casp., Balkh., Kyz. K. (?). Gen. distr.: Dzu.-Kash. Described from Lake El'ton. Type in London.

2. *S. paradoxa* Bge. in A. H. P. VI (1880) 427. — *Belowia paradoxa* Bge. *Reliq. Lehm.* (1851) 286. — Exs.: HFR no. 1430.

Annual, 50–120 cm high, glabrous, glaucous-green, branched; leaves linear, flat, stiffish, acute to obtusish, narrowing toward base, closely approximate on the branches, upright, arranged 1-sidedly in a vertical plane, the floral leaves much reduced, oblong-ovate to ovate; flowers mostly in many-flowered clusters on the flowering branchlets, perfect and pistillate, forming a panicle inflorescence; perianth subglobular, dorsally

flattened; segments in perfect flowers united only at base, in the pistillate united to between one-half and two-thirds; fruiting perianth obovoid, with somewhat elongating connivent segments; fruit vertical; seeds rotund to rounded-oval, of two kinds, some strongly convex, 1—1.5 mm long, rather indurated, black, sublustrous, coarsely and prominently granular, others strongly flattened, ca. 2 mm in diameter, tawny, smooth, soft. July—August.

"Tugai"; commonly as weed in cotton fields and generally in irrigated fields and on wasteland; solitary or in groups. — Centr. Asia: Balkh. (?), Kyz. K. (?), Kara K., Amu D., Syr D. Endemic. Described from a locality between the cities of Bukhara and Samarkand. Type in Paris; cotype in Leningrad.

Economic importance. According to I. A. Linchevskii, a good forage plant, especially for camels.

3. *S. glauca* Bge. in Bull. Acad. Pétersb. XXV (1879) 362 et Mél. Biol. X, 293. — *Schoberia glauca* Bge. in Enum. pl. Chin. bor. (1831) 56. — *Chenopodina glauca* Moq. in DC. Prodr. XIII, 2 (1849) 162. — *Salsola asparagoides* Miq. Prolus. Fl. Jap. (1866—67) 126. — *S. altissima* Dryander in Moq. Chenop. (1840) 131, non Pall. — *Suaeda stauntonii* Moq. Chenop. (1840) 131. — *Helicilla altissima* Moq. in DC. Prodr. XIII, 2 (1849) 170. — Exs.: HFR no. 2369 et 2370.

179

Annual, 15—75 cm high, glaucous, stem erect, branched; lower branches mostly arched-recurved; leaves numerous, narrowly linear, 1—5 cm long and 0.75—1.2 mm broad, flattish, slightly convex on the underside, acute or acuminate, borne on small tubercles, closely approximate and secund on the lower branches; inflorescence paniculate; flowers in clusters of 1—3, the uppermost always solitary; clusters short-peduncled, the central flower commonly perfect, the smaller lateral ones commonly pistillate; perianth in most flowers (with horizontal seed) strongly flattened dorsally, often attenuate toward base (especially in maritime specimens), accrescent in fruit, the segments with tubercled stellately spreading keels; perianth of flowers with vertical seed scarcely changed in fruit, ecarinate, without stellately spreading outgrowths; the second type occasionally predominant; stigmas 2, short, filiform; seeds 2—2.5 mm in diameter, of two kinds, some black, strongly convex, almost dull, with brittle minutely granular testa, others tawny, strongly flattened, dull, with scarious testa and prominent embryo. July—August. (Plate IX, Figure 1 a—c).

Saline meadows, solonchaks, sandy and sand-and-pebble seashores, refuse dumps and weed-infested places. — E. Siberia: Ang.-Say.; Far East: Uss. Gen. distr.: Mong., Jap.-Ch. Described from the vicinity of Peking, near Kangtai. Type in Leningrad.

Note. It is noteworthy that flowers with tawny horizontal seeds predominate in most maritime specimens, while black vertical seeds are more common in continental plants. Occasional exceptions do, however, occur.

Subsection 2. LEIOSPERMA Iljin, l. c. — Seeds smooth or obscurely reticulate.

4. *S. microphylla* Pall. Illustr. (1803) 52; Fenzl in Ldb. Fl. Ross. III, 779; Shmal'g., Fl. II, 378; Kryl., Fl. Zap. Sib. IV, 936. — *S. biebersteiniana* C. Koch in Linnaea XVII (1843) 312 in obs. — *Chenopodina biebersteiniana* Moq. in DC. Prodr. XIII, 2 (1849) 163. — *Suaeda vera* Fenzl, l. c., 780, non Forsk. — *Schoberia microphylla* C. A. M. Verzeichn. cauc. (1831) 159. — *Chenopodium villosum* Spreng. Syst. veg. 1 (1825) 924. — *Chenopodium crassifolium* M. B. Fl. taur.-cauc. III (1819) 176. — Ic.: Pall., l. c., t. 44. — Exs.: Herb. Fl. cauc. no. 169; HFR no. 1887 (var. *multiflora* Litw.).

A small shrub, 30—75 cm high, much branched, with cinereous-glaucous annotinous shoots covered with very short hairs; leaves glaucous, glabrous, fleshy, mostly 3—10 mm long, terete, almost botuliform, obtuse, abruptly narrowing into a very short petiole, divergent, the floral and ramal somewhat arched-upcurved, the cauline longer and straight; flowers few in a cluster, mostly 2 or 3, rarely up to 20 (var. *multiflora* Litw. in Sched. ad HFR); perianth subglobose, the oblong-ovate freely connivent segments united only at base; seeds mostly vertical, intermixed with some horizontal and oblique ones, oval or rounded-oval, 0.75—1.25 mm long, strongly convex, black, lustrous, smooth or rather obscurely punctate-reticulate. June—August.

Gypsiferous and puffy solonchaks, takyrs, salinas and clayey solonchak plains; usually in large thickets and in groups. — Caucasus: Dag., E. and S. Transc.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Mtn. Turkm., Amu D., Syr D. Gen. distr.: Arm.-Kurd., Iran., Dzu.-Kash. Described from the shores of the Caspian Sea between the Kuma and Terek rivers. Type in London.

Economic importance. The plant is of importance as a source of potash; local inhabitants use it for soap production. A forage plant, according to I. A. Linchevskii, apparently for camels. Abolin and Sovetkina report the following percentage composition of plants from the Talas-Susamyr District of the Kirghiz ASSR for the beginning of September and the end of November, respectively: hygroscopic water 4.36 and 6.86, ash 37.57 and 46.00, cellulose 15.24 and 7.84, crude protein 5.53 and 6.34, crude fat 2.86 and 0.76, nitrogen-free extract 34.44 and 32.20. The plant is of interest for ornamental use.

5. *S. altissima* (L.) Pall. Illustr. (1803) 49; Shmal'g., Fl. II, 378; Il'in in Fl. Yugo-Vost. IV, 201; Fenzl in Ldb. Fl. Ross. III, 781; Kryl., Fl. Zap. Sib. IV, 936. — *Chenopodium altissimum* L. Sp. pl. (1753) 221. — *Salsola altissima* L. Sp. pl. ed. 2 (1762) 324. — *Chenopodium filiforme* Moench, Meth. (1794) 330. — *C. filifolium* Fenzl in Ldb. l. c. — *Cochliospermum altissimum* Lag. Mém. pl. Barill. (1817) 57. — *Schoberia altissima* C. A. M. in Ldb. Fl. Alt. I (1829) 402. — *Sch. trigyna* C. A. M., l. c. — *S. lejosperma* C. A. M., l. c. — *Chenopodina leiosperma* Moq. in DC. Prodr. XIII, 2 (1849) 162. — *C. altissima* Moq., l. c. — *Schanginia altissima* C. A. M. Verzeichn. cauc. (1831) 150. — *Suaeda lejosperma* Moq. Ann. Sc. nat. I sér., XXIII (1831) 306. — *Salsola lajosperma* D. Dietr. Syn. pl. II (1840) 997. — *Suaeda maxima* C. Koch in Linnaea XVII (1843) 312. — *S. heterocarpa* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 781. — *Chenopodium salsum* Hohen. pl. cauc. exs. in itin. 1834 et Fenzl in Ldb., l. c. — *Salsola trigyna* Willd.

Sp. pl. I (1797) 1312. — *Kochia trigyna* Link, Enum. Hort. Berol. I (1821) 246. — *Lerchea altissima* Medic. Phil. Bot. I (1789) 33. — *Dondia altissima* Druce, List. Brit. pl. (1908) 60. — Ic.: Pall. Illustr., t. 42; Ldb., Ic. pl. Fl. Ross. I, tab. 45; Sornye rast. SSSR, II (1934), fig. 126; Rchb., Ic. Fl. Germ. XXIV, tab. 289, f. 7 et 8. — Exs.: Callier It. taur. 1900, no. 721.

181 Annual, 25–200 cm high, erect, branched, often blackening in drying, frequently with a somewhat dingy-purple stem, glabrous or the tips of young stems covered with short fugacious scarious hairs; leaves alternate, filiform-terete, acute to subobtusate, mostly very slightly narrowing at base, the floral arcuately incurved and surpassing the flowers; flowers perfect and pistillate, glomerate; clusters compact and apparently sessile (var. *confertiflora* Fenzl in Ldb., l. c.) or distinctly peduncled (var. *vulgaris* Fenzl, l. c.); inflorescence a pyramidal panicle; perianth somewhat attenuate at base, divided to the middle; segments ovate to suborbicular, ecarinate, completely converging in fruit; seeds rotund to rounded-oval, 1–2 mm long, vertical, sometimes intermixed with horizontal ones, convex, black, smooth, obscurely and finely reticulate. July–September. (Plate IX, Figure 3).

Weed-infested ground, refuse dumps, ruderal places, irrigation ditches, "tugai," waterside solonchaks, and solonetztes; a weed of irrigated crops; solitary or in groups. — European part: Bl., Crim., L. Don (S.), L. V.; Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: Alt.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Mtn. Turkm. Gen. distr.: Med., Bal.-As. Min., Iran., Dzu.-Kash., Mong. Described from Astrakhan. Type in London.

Economic importance. Occasionally used for soda extraction. Sometimes made into whisk-brooms in desert areas. According to Agabab'yan, Granitov, and Kasimenko, the plant is eaten by camels after spells of frost.

Note. The name *S. heterocarpa* Fenzl refers to *S. altissima* (L.) Pall. with perianth swollen due to frost injury. The indication concerning frutescent habit is of no significance, since this was reported by Bunge as early as 1880.

Section 2. LACHNOSTIGMA Iljin in Sovietskaja Botanika, 5 (1936). — Flower clusters borne directly in the leaf axils; seeds vertical or horizontal, lustrous, obsoletely sculptured; heterocarpy not developed; ovary concavely truncate at the top; stigmas mostly 3, long, thickish, covered with long capillary papillae. Mostly shrubs, rarely annuals.

6. *S. dendroides* (C. A. M.) Moq. Chenop. (1840) 126; Fenzl in Ldb. Fl. Ross. III, 778; Il'in in Fl. Yugo-Vost. IV, 194. — *Schoberia dendroides* C. A. M. Verzeichn. cauc. (1831) 159. — *Salsola fruticosa* M. B. Beschreib. d. Länder zw. d. Fluss. Terek u. Kur. am. Casp. Meer (1800) 149, app. no. 22, non L. — *Suaeda microphylla* auct. plur., non Pall.

Divaricately much branched undershrub, 20–60 cm high; young shoots clothed at the tips with mostly long crisp hairs; leaves linear, semiterete, succulent, obtuse except for the arcuately incurved subacute uppermost ones, very slightly narrowing toward base, often glaucous, especially when young, 3–15 mm long; flowers sessile, 2–6 or rarely more in axillary

clusters, both perfect and pistillate; perianth subglobular or broadly ovoid, flattened from the top especially in lateral flowers; segments free to the base, oblong, arcuately connivent after anthesis; stamens as long as the perianth; ovary with 2 or 3 stigmas on obsolescent style. May.

Solonchaks; scattered or in groups. — European part: L. V.; Caucasus: Dag., E. Transc.; Centr. Asia: Ar.-Casp. (Mangyshlak). Endemic. Described from the area between Derbent and the Kura River. Type in Leningrad.

Economic importance. Used as material for potash extraction. Of interest for ornament.

7. *S. arcuata* Bge. Reliq. Lehm. in Mém. Sav. étrang. VII (1851) 461; Boiss. Fl. Or. IV, 943. — *S. heterocarpa* auct. turk., non Fenzl.

Annual, 50—100 cm high, with an erect, often woody, virgately branching stem, glabrous, or, when young, covered in the inflorescence with short brittle fugacious hairs; leaves linear-filiform, slightly semiterete, 1.5—4 cm long and 0.75—1.25 mm broad, slightly narrowing toward base, more or less divergent; bracts arched-incurved, surpassing the flower clusters; clusters many-flowered, compact, short-peduncled and apparently sessile, forming together a narrowly pyramidal paniculate inflorescence; perianth globular-ovaloid, divided to the middle or lower down into ovate obtuse segments, spongy-fleshy, apparently inflated, sometimes intermixed with noninflated perianths; stigmas thickish; seeds vertical, mostly intermixed with horizontal, 1—1.5 mm long, black, smooth, obscurely and finely reticulate-punctate. August—October.

Waterside solonchaks; a weed of irrigated crops. — Centr. Asia: Kara K. (S.), Amu D. Gen. distr.: Iran. Described from the Yany-Darya area (Kyzyl-Kum Desert). Type in Paris; cotype in Leningrad.

Section 3. **CONOSPERMA** Iljin in Sovietskaja Botanica 5 (1936). — Section *Salsina* Moq. Enum. (1840) 121 (p. p.). — Section *Chenopodina* Moq., l. c., 124 (p. p.). — *Schanginia* Moq. in DC. Prodr. XIII, 2 (1849) 153 (p. p.); Fenzl in Ldb. Fl. Ross. III, 774 (p. p.), as genus. — *Suaeda* Moq., l. c., 155 (p. p.); Fenzl, l. c., 777 (p. p.), as genus. — *Chenopodina* Moq., l. c., 159 (p. p.), as genus. — *Calvella* Moq., l. c., 167, as genus. — *Belowia* Moq., l. c., 168; Fenzl, l. c., 792, as genus. — *Schoberia* C. A. M. in Ldb. Fl. Alt. I (1829) 395 (p. p.); Fenzl, l. c., 790 (p. p.); Asch. et Gr. Syn. V, 197 (p. p.). — Flower clusters inserted in the axils; leaves often pellucid-margined; seeds vertical and horizontal on the same plant, small, strongly convex, black, very glossy, quite smooth; heterocarpy very rare; stigmas thin and rather short, papillose, inserted on the concavely truncate top of the ovary. Annual plants.

8. *S. lipskyi* Litw. in Sched. ad Herb. Fl. Ross. III (1901) 35. — Exs.: HFR no. 736.

Annual, 10—40 cm high, glabrous; stem erect, yellowish-green, branching or more rarely simple; leaves filiform, terete, 10—20 mm long and ca. 1 mm broad, obtuse, very slightly narrowing toward base, glaucous, rather straight; bracts arcuately upcurved, surpassing the flower clusters; clusters of (1) 3—7 or rarely more flowers, axillary or very slightly

shifted onto the petiole; flowers perfect, rarely intermixed with pistillate ones, dimorphic: some larger, ca. 1 mm long, with obovoid perianth divided into ovate-oblong hood-shaped segments expanded in fruit and always with vertical seed, others smaller, with connivent segments and vertical seed; more rarely flowers mostly lateral, with horizontal seed and contracted perianth; stigmas 3, thickish; seeds rounded-oval, ca. 1 mm long, convex, black, glossy, smooth. Fl. April—May; fr. June—July.

Saline sands, especially among *Haloxylon* communities. — Centr. Asia: Kara K., Kyz. K., Syr D. Endemic. Described from Repetek. Type in Leningrad.

Note. The stigma in this species approaches that characteristic of the preceding section.

9. *S. pygmaea* (Kar. et Kir.) Iljin comb. nov. — *S. minima* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 789; Kryl., Fl. Zap. Sib. IV, 939. — *Chenopodina minima* Moq. in DC. Prodr. XIII, 2 (1849) 162. — *Schoberia pygmaea* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 436. — Exs.: Kar. et Kir. pl. soong. no. 1874.

Annual, 3—10 cm high, rarely higher, with simple or bushy-branched stem; leaves glaucous, oblong-spatulate or oblanceolate, rather succulent, flattish, obtuse, often terminating in a caducous bristle; clusters 3—6-flowered; perianth divided to the middle; segments ovate or oval, obtuse, obtusely rounded on the back, cucullate, connivent; seeds black, glossy, vertical. Fl. May; fr. May—June.

Saline sands. — Centr. Asia: Balkh. Endemic. Described from a locality between Uzun-bulak and Gorkii piket (Kazakhstan). Type in Paris; cotype in Leningrad.

Note. Strikingly resembling *S. lipskyi* Litw., and perhaps merely a form of this species. More ample material is needed to settle the matter.

184 10. *S. confusa* Iljin in Fl. Yugo-Vost. IV (1930) 196. — *S. setigera* auct. europ. ross. et cauc., non Moq. — *S. salsa* Pall. (p. p.) Illustr. (1803) 46 et auct. plur. — *S. acuminata* auct. europ. ross., non (C. A. M.) Moq. — *S. splendens* Grossh. in Fl. Kavk. II (1930) 72, non Gr. et Godr. — (?) *S. gracilis* Moq. Chenop. (1840) 123; Fenzl in Ldb. Fl. Ross. III, 780 (sec. Bge.). — *Belowia baccifera* Moq. in DC. Prodr. XIII, 2 (1849) 168. — *Schoberia baccifera* C. A. M. in Hoh. en Talysch. (1838) 357 (sec. Bge.). — *Salsola clavifolia* Hohen. pl. exc. in it. anni 1834 (sec. Bge.).

Annual, 5—50 cm high, glaucous, glabrous, mostly bushy-branched from base; leaves narrowly linear, flat above, slightly convex beneath, acute or acuminate, sometimes minutely bristle-tipped, the upper ones arched-incurved; clusters axillary, containing mostly perfect and some pistillate flowers, forming a rather compact spiciform inflorescence; bracts greatly surpassing the clusters, arcuate, subappressed to the stem or somewhat divergent, slightly obtuse-keeled on the back near the base; perianth segments free at least to the middle, hood-shaped, sometimes keeled; stigmas 2 or 3, sessile, villous, mostly more than 1 mm long; seeds mostly horizontal, 1—1.5 mm long and 0.5—1 mm broad, strongly convex, black,

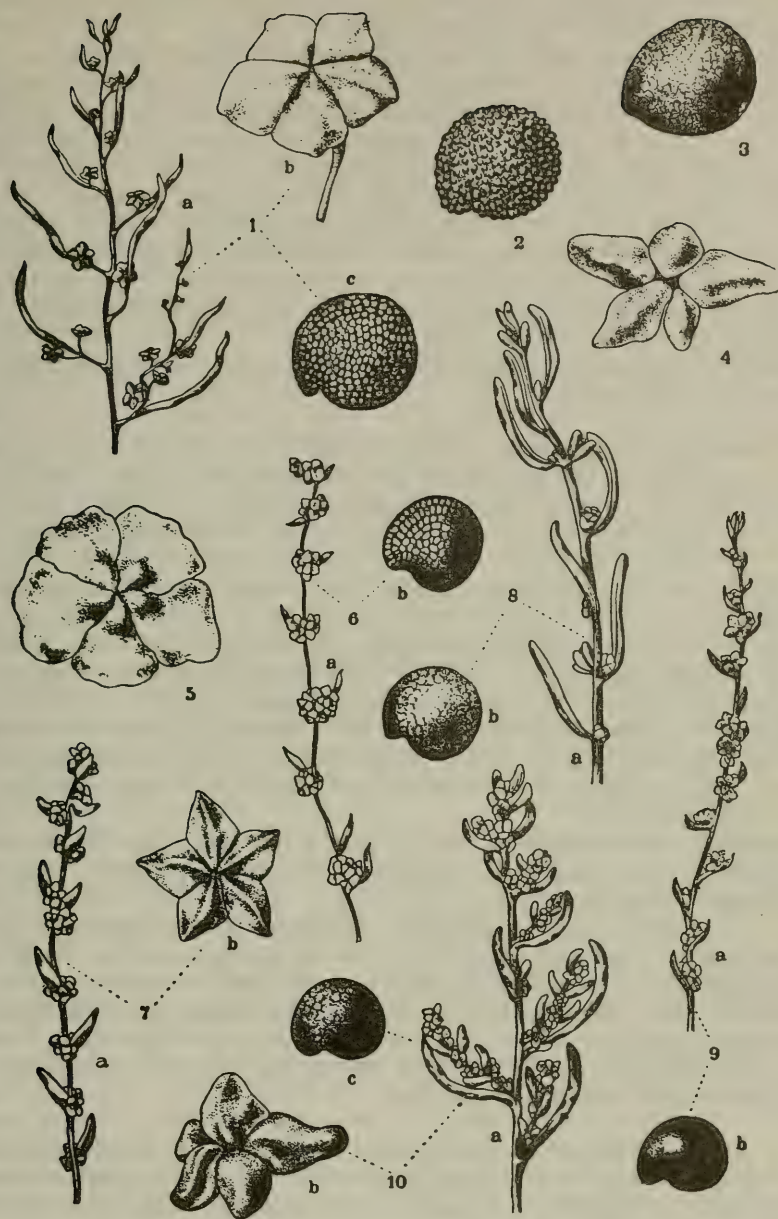


Plate IX. 1. *Suaeda glauca* Bge.: a) branch, b) perianth, c) seed.— 2. *S. linifolia* Pall.: seed.— 3. *S. altissima* (L.) Pall.: seed.— 4. *S. corniculata* (C.A.M.) Bge.: perianth.— 5. *S. heterophylla* (Kar. et Kir.) Bge.: perianth.— 6. *S. prostrata* Pall.: a) branch, b) seed.— 7. *S. olufsenii* Pauls.: a) branch, b) seed.— 8. *S. salsa* (L.) Pall.: a) branch, b) seed.— 9. *S. acuminata* (C.A.M.) Moq.: a) branch, b) seed.— 10. *S. drepanophylla* Litw.: a) branch, b) perianth, c) seed.

horizontal, 1—1.5 mm long and 0.5—1 mm broad, strongly convex, black, glossy, smooth, sometimes developing in late fall and then flat, yellowish-brown and dull. August—September.

"Sarsazanniki" and puffy solonchaks; salinas; scattered but mostly in considerable numbers. — European part: Bl., Crim., L. Don (S.), Transv. (S.), L. V.; Caucasus: Cisc., Dag., S. and E. Transc.; W. Siberia: U. Tob. (SW); Centr. Asia: Ar.-Casp. Gen. distr.: Arm.-Kurd. Described from the Lake El'ton area. Type in Leningrad.

Note. Reports referring to the West Mediterranean species *S. splendens* (Pourr.) Gr. et Godr. Fl. Fr. III (1855) 30 (= *S. setigera* Moq.) in the USSR flora, made by various authorities, are groundless. These species are not even related and they belong to different cycles. Above all, the seed structure clearly points to the *S. maritima* L. cycle rather than to *S. acuminata* C. A. M.

Economic importance. The plant may be used as a source of soda. Of interest for ornament.

11. *S. baccifera* Pall. Illustr. (1803) 48; Il'in in Fl. Yugo-Vost. IV, 195. — *Schanginia baccifera* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 776 (partim). — *Euchylaena borysthenis* Spreng. Syst. veget. I (1825) 923. — *Chenopodina baccifera* Moq. in DC. Prodr. XIII, 2 (1849) 160 (?). — Ic.: Pall., l. c., t. 41; Fl. Yugo-Vost. IV, (1930), fig. 276.

187 Annual, 15—50 cm high, glaucous, glabrous, bushy-branched from base; leaves fleshy, semiterete, mostly arched-incurved; flowers either perfect or pistillate in compact axillary clusters; fruiting perianth often baccate and rose-colored, subglobular, divided to below the middle into wingless hooded segments; ovary in central axillary flowers vertical, in lateral ones horizontal; seeds rounded-oval, 0.75—1.25 mm long and 0.5—1 mm broad, black, smooth, glossy, convex, those developing in fall mostly larger, 1.5—2 mm long, flat, dull, olivaceous or brown, with prominent embryo. August—September.

Solonchaks. — European part: Bl., L. Don, L. V.; Caucasus: E. Transc. (?). Endemic. Described from the area of the Samara River, a tributary of the Dnieper. Type in London.

Note. A rather enigmatic species. Schmalhausen considers it to be synonymous with *S. altissima* Pall. Taking into account the illustration and the description, I am more inclined to refer it to *S. confusa* Iljin. Yu. Grigor'ev and I both chanced to collect in the Transvolga semidesert specimens which do not differ from the plant illustrated by Pallas. It is, however, possible that *S. baccifera* Pall. is merely a late autumnal frost-affected form of *S. confusa* Iljin.

12. *S. acuminata* (C. A. M.) Moq. in Ann. Sc. Nat. Sér. 1, XXIII (1831) 309. — *Schoberia acuminata* C. A. M., l. c., 401. — *Sueda setigera* Fenzl in Ldb. Fl. Alt. I (1829) 398. — *Schoberia salsa* C. A. M. in Ldb. Fl. Ross. III, 2 (1851) 783 (p. p.), non Moq. — *S. salsa* auct. Fl. turk. plur., non Pall. — Ic.: Ldb. Ic. Fl. Ross. t. 44.

Annual, 10—75 cm high, glabrous, mostly erect, with obliquely ascending branches, sometimes bushy-branched, often with reddish stem; leaves glaucous, narrowly linear, flat above, convex beneath, acuminate or acute,

sometimes minutely bristle-pointed; flowers mostly perfect, in compact axillary clusters of 2–5; bracts acuminate, equaling or at most 1.5–2 times as long as the clusters, these disposed in loose spiciform inflorescences together forming a panicle; perianth segments hooded; stigmas 2 or 3, mostly not more than 0.5–0.75 mm long; seeds vertical or horizontal, 1–1.5 mm long, black, strongly convex, glossy and smooth. July–September. (Plate IX, Figure 9a–b).

Solonchaks, solonchak meadows, and refuse dumps. — W. Siberia: (?) Irt. (S.); Centr. Asia: Ar.-Casp. (E.), Balkh., Dzu.-Tarb., (?) Kyz. K., Syr D. (?). Gen. distr.: Dzu.-Kash. Described from the former Semipalatinsk Province ("in deserto soongoro-kirghisico"). Type in Leningrad.

13. *S. pterantha* (Kar. et Kir.) Bge. in A. H. P. VI, 2 (1880) 430; Kryl., Fl. Zap. Sib. IV, 941. — *Schoberia pterantha* Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 734; Fenzl in Ldb. Fl. Ross. III, 791. — *Calvelia pterantha* Moq. in DC. Prodr. XIII, 2 (1849) 167. — *Suaeda kareliniana* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 789; Kryl., Fl. Zap. Sib. IV, 939. — *Schanginia arbuscula* Kar. et Kir., l. c., 733. — *S. kareliniana* var. *vulgaris* Trautv. in Bull. Soc. Nat. Mosc. XL (1867) 63.

Annual, 10–40 cm high, glaucescent or yellowish-green, erect, mostly bushy-branched, glabrous, inflorescence covered with very short crisp fugacious hairs; leaves convex beneath, flat above, oblong-linear, very slightly narrowing toward base, obtuse and mostly minutely mucronulate or more rarely terminating in a short caducous bristle; bracts oblong or oval; cluster of 1–5 flowers, forming interrupted spiciform inflorescences, the flowers perfect and some (mostly the lateral) pistillate; perianth mostly divided to the middle; segments hooded, keeled; segments of fruiting perianth bearing on the keel membranous longitudinal wings, especially in central flowers, the lateral flowers often with additional small transversal winglike outgrowths; stigmas 2 or 3, sessile, subulate, 0.25–0.4 mm long; seeds small, 0.75–1 mm in diameter, black, very convex, glossy and smooth, in the axillary flowers vertical, in lateral ones mostly horizontal. August–September.

Solonchaks, mostly puffy. — Centr. Asia: Balkh. Gen. distr.: Dzu.-Kash. Described from Zaisan. Type in Leningrad.

14. *S. transoxana* (Bge.) Boiss. Fl. or. IV (1879) 943. — *Schoberia transoxana* Bge. Reliq. Lehm. (1851) 291. — Exs.: HFR no. 686 (sub *S. arcuata* Bge.).

Annual, 10–30 cm high, glaucescent, glabrous, often bushy-branched from the very base, the lower branches elongated; leaves oblong-linear, obtuse, slightly convex beneath, more or less concave above, succulent, arched-upcurved, especially the upper ones; bracts shorter, also arcuate; clusters many-flowered, almost from the base of the plant, containing both perfect and small lateral pistillate flowers; perianth segments oval to oblong-oval, obtuse, 3-nerved; stigmas mostly 3, more rarely 2, short, 0.25–0.5 mm long, sessile; seeds vertical, rounded-oval, ca. 1 mm long, strongly convex, with rounded margins, black, very glossy, smooth, not sculptured. July–September.

Solonchaks. — Centr. Asia: Kyz. K., Syr D., Kara K., Amu D. Gen. distr.: Iran. Described from the Yany-Darya area. Type in Paris; cotype in Leningrad.

15. *S. microsperma* (C. A. M.) Fenzl in Ldb. Fl. Ross., III, 2 (1851) 785. — *S. microsperma* α *erecta* Fenzl, l. c. — *Schoberia microsperma* C. A. M. in Eichw. Pl. casp.-cauc. (1831—33) 14. — *Chenopodina microsperma* Moq. in DC. Prodr. XIII, 2 (1849) 165. — Ic.: Eichw., l. c., t. 13. — Exs.: HFR no. 636 (sub *S. kareliniana*).

189 Annual, glaucous, 5—30 cm high, glabrous, strongly branching from base, the elongated lower branches ascending; leaves small, oblong, oval, or oblong-obovate, flat, slightly convex beneath, markedly narrowing at base, obtuse and mostly terminating in a caducous bristle or in a small sharp tubercle, the upper ones or all arched-incurved, the cauline more or less appressed to the stem; flowers in clusters of 1—5, mostly 3, of these the central usually vertical and perfect, the lateral flattened from above, mostly pistillate; perianth small, free to between one-half and two-thirds; segments cucullate, covering the fruit, keeled on the back, the convex parts of the keel often tubercled and not infrequently pectinate; anther locules free to between one-third and one-half; stigmas mostly 3, sessile; seeds horizontal, in the axils often vertical, small, rounded-oval, 0.6—1 mm long and 0.5—0.75 mm broad, blackish-brown to almost black, smooth, glossy. July—September.

Solonchaks. — Centr. Asia: Kyz. K. (S.), Kara K., Amu D. Endemic. Described from Turkmenia, from the eastern shore of the Caspian Sea (Krasnovodsk, Dagada Island). Type in Leningrad.

Economic importance. According to I. A. Linchevskii, a forage plant (under the name *S. kareliniana*), apparently for camels.

16. *S. eltonica* Iljin in Bull. Jard. Bot. Princ. d. l'URSS XXVI, 4 (1927) 415; Il'in in Fl. Yugo-Vost. IV, 201. — Ic.: Fl. Yugo-Vost., p. 202, fig. 279. — Exs.: HFR no. 3035.

Annual, 100—150 cm high, glabrous, the thick stem woody at base; leaves linear, flat, 20—40 mm long and 2—3 mm broad, fleshy, sessile; flowers in clusters, axillary; central flowers strictly axillary, perfect, rarely pistillate, globular or ovaloid, the mostly fleshy perianth ca. 3 mm in diameter, the gibbous keeled segments with connivent cucullate tips, the pistil with 3 stigmas, the seed vertical; lateral flowers 1 or 2 (3), mostly pistillate, borne on either side of the bract in the axils of small ovate or oblong-ovate scarious unequally denticulate bracteoles, the perianth somewhat flattened from above, the keelless segments slightly transversely winged, the horizontal seeds yellowish and dark-speckled when young, blackening in maturity, glossy, obsoletely punctate. August—September.

Wet solonchaks; in groups. — European part: L. V. Endemic. Described from Lake El'ton. Type in Leningrad.

17. *S. turkestanica* Litw. in Sched. ad Herb. Fl. Ross. VI (1908) 110. — Exs.: HFR no. 1838.

189 Annual, 75—150 cm high, glabrous; stem erect, somewhat lustrous, pale, often to 10 mm in diameter at base, becoming woody to a considerable height, branching from base, the basal branches elongated, the shorter

cauline branches mostly arcuately divergent, densely leafy; leaves linear, 10–30 mm long and 2–3 mm broad, flat, obtuse, very slightly narrowing at base, uprightly divergent, somewhat succulent, nearly all with flowers in their axils; bracts abbreviated, the uppermost very slightly shorter to barely surpassing the cluster, oblong to oval; clusters (1) 3–6-flowered, strictly axillary and sessile; flowers of two kinds, some larger, ca. 1 mm in diameter, perfect, the perianth flattened from above, its lower part spongy-acrescent in fruit and often bearing tubercular-keeled transversal lobes, the cucullate segments distinctly keeled, others smaller, pistillate, with unchanged perianth; stigmas 2, more rarely 3, sessile; seeds of the larger flowers horizontal, those of the smaller ones vertical, rotund or oval-rotund, ca. 1 mm in diameter, convex, black or blackish-brown, glossy, smooth. September.

Solonchaks. — Centr. Asia: Amu D., Syr D., Mtn. Turkm. (Badkhyz). Endemic. Described from the "Divana-bag" Uzbek burial ground near Chardzhov. Type in Leningrad.

Economic importance. According to I. A. Linchevskii, a forage plant, apparently for camels.

Section 4. *PHYSOPHORA* Iljin in *Sovietskaja Botanica*, 5 (1936). — Flower clusters in the axils of bracts; ovary truncate, flat-topped; stigmas 3 or more rarely 2, very short, thickish, obtuse, mostly spatulate, naked, sessile, rather disconnected; fruiting perianth inflated; seeds mostly horizontal, dimorphic, the black ones regularly reticulate.

18. *S. physophora* Pall. Illustr. (1803) 51; Fenzl in Ldb. Fl. Ross. III, 777; Shmal'g., Fl. II, 379; Il'in in Fl. Yugo-Vost. IV, 194; Kryl., Fl. Zap. Sib. IV, 935. — *Salsola physophora* Schrad. in Schult. Syst. veget. VI (1820) 238. — *Chenopodina physophora* Moq. in DC. Prodr. XIII, 2 (1849) 164. — *Enchylaena physophora* Spreng. Syst. Veget. 1 (1825) 923. — *Schoberia physophora* C. A. M. in Ldb. Fl. Alt. 1 (1829) 396. — Ic.: Pall., l. c., t. 43; Acta Univ. As. Med. ser. VIII-b, 21, fig. 20.

Undershrub, profusely branched from base, 30–100 cm high; young branches whitish, naked or covered with very short papillae; leaves linear, almost semiterete, succulent, obliquely ascending, very slightly dilated at base, falling off at a joint; flowers sessile in the axils of bracts, solitary or 2 or 3 together, rarely more, disposed in a pyramidal paniculate inflorescence; the central axillary perfect flower with globular perianth, the mostly pistillate lateral flowers with a somewhat flattened perianth; perianth segments of all flowers ovoid, obtuse, arched-connivent, mostly connate at least to the middle; ovary with 3 or more rarely 2 short thickish sessile naked stigmas; seeds mostly horizontal, ca. 2 mm in diameter (those of lateral flowers smaller), scarcely glossy, obsoletely punctate. June — August.

Crustose and lumpy solonetz soils; in groups or scattered, sometimes over considerable areas. — European part: L. V.; Caucasus: Dag. (?); W. Siberia: U. Tob. (S.), Irt. (S.), Alt. (SW); Centr. Asia: Ar. -Casp., Balkh., Kyz. K., Syr D. (?). Endemic. Described from the shores of the Caspian Sea. Type in London.

Economic importance. Used as a source of potash.

Section 5. *HETEROSPERMA* Iljin in *Sovietskaja Botanika* 5 (1936) — Sect. *Chenopodina* Moq. Enum. (1840) 124 (p. p.). — *Schoberia* C. A. M. in Ldb. Fl. Alt. I (1829) 399 (p. p.) et Moq., l. c., 132, as genus. — *Chenopodina* Moq. in DC. Prodr. XIII, 2 (1849) 159 (p. p.), as genus. — *Brezia* Moq., l. c., 167. — *Suaeda* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 777 (p. p.), as genus. — Flower clusters strictly axillary; seeds more compressed, brownish or blackish-brown, more or less markedly reticulate, always horizontal; stigmas slender, very short, smooth, inserted on the constricted tip of the ovary; heterocarpy common.

Cycle 1. *Salsae* Iljin. — Seeds inconspicuously sculptured.

19. *S. salsa* (L.) Pall. Illustr. (1803) 46 (p. p.). — *Schoberia obtusifolia* Bge. Rel. Lehm. (1851) 290. — *Suaeda obtusifolia* Trautv. in Bull. Soc. Nat. Mosc. XL (1867) 62. — *Chenopodium salsum* L. Sp. pl. (1753) 221. — *Salsola salsa* L. Sp. pl., ed. 2 (1762) 324. — *Chenopodina salsa* Moq. in DC. Prodr. XIII, 2 (1849) 160 (p. p.). — *Schoberia salsa* C. A. M. in Eichw. pl. casp.-cauc. (1831-33) 6. — *Suaeda salsa* α *crassifolia* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 786. — Ic. — Pall., l. c., t. 39.

192 Annual, 25—100 cm high, glaucous, glabrous; stems robust, erect or somewhat ascending below, branching from the base; branches obliquely ascending, the youngest shoots often turning black in drying; leaves very succulent, semiterete or narrowly oblong-oblancheolate, strongly convex beneath, concave above or rather with involute and often contiguous margins, obtuse or rounded at apex, very slightly narrowing at base; upper leaves and bracts broader, often oblong or oval and often markedly attenuate at base; flowers small, in clusters of several, bracteolate; perianth subglobular; segments rounded on the back, obtuse, thin; bracteoles orbicular or oval, subentire, scarious, shorter than perianth; stigmas short, filiform; seeds horizontal, rotund or rounded-oval, ca. 1 mm in diameter, strongly compressed, sharp-margined, black or more often blackish-brown, glossy, smooth, obsoletely reticulate-punctate. August—September. (Plate IX, Figure 8 a—b).

Maritime or more rarely continental solonchaks. — European part: L. V. (Astrakhan); Caucasus: E. Transc.; Centr. Asia: Kyz. K. (Aral Seashores), Kara K. (Caspian coast). Gen. distr.: reported for the Balkan Peninsula and Hungary, but these reports need critical checking. Described from the vicinity of Astrakhan. Type in London?

Note. This species has been most variously interpreted by different authorities and it is the subject of much confusion in the literature. This is due to the fact that the authorities paid attention to the coloring of the plant rather than to details of its morphology. Thus various forms of *S. confusa* Iljin and *S. acuminata* (C. A. M.) Moq., with more obtusish leaves, have been formally referred to *S. salsa* (L.) Pall. Yet, as far as can be deduced from available material, this is a distinctive, largely maritime species, readily distinguishable by its foliage, perianth, and seeds. The seeds point rather to genetic affiliation with *S. prostrata* Pall., although they are more glossy, smooth, and almost imperceptibly

sculptured. The illustration presented by Pallas provides an inadequate representation of this species.

Economic importance. Wehmer reports the following percentage composition of Austrian specimens of *S. salsa* Pall.: water 75.94, ash 5.74 (on dry weight basis 23.86); the ash content being Na. 26.69, K 2.97, Mg 2.66, Ca 3.25, Fe 0.67, Al 2.93, Cl 25.32, SO₄ 24.27, PO₄ 1.87, CO₃ 9.36, besides SO₃ and some other components.

20. *S. ussuriensis* Iljin in Acta Instit. Bot. Ac. Sc. ser. I, fasc. II (1936). 125.

Annual, 10–50 cm high, glaucescent-green, becoming reddish-yellow or purple, glabrous; stems erect or more rarely ascending, usually branching from base, rarely simple; leaves linear-filiform, semiterete, 1–3 cm long and 0.75–1.2 mm broad, at least the upper acute, the lower often obtusish; bracts much abbreviated, slightly surpassing or the uppermost equaling the clusters; flowers perfect, intermixed with pistillate, in many-flowered axillary clusters, forming an interrupted apparently verticillate spiciform inflorescence; perianth segments fleshy, hooded, connivent, mostly distinct to below the middle, in fruit prominently keeled, with triangular-winged transversal protuberances near the base, hence the perianth apparently stellate with a raised center; stigmas 2, sessile, very short; anthers rounded-oval; seeds horizontal, 1–1.5 mm in diameter, of two kinds, some convex, with blackish-brown brittle glossy smooth or reticulate-punctate testa, others flat, compressed, with scarious yellowish-brown dull smooth testa and prominent embryo. July–September.

Seashores. — Far East: Uss. Gen. distr.: (?) Manch., Jap.-Ch. Described from the vicinity of Kangui village at the mouth of the Tumyn-gan River (Ussuri). Type in Leningrad.

Note. This species is undoubtedly closely related to *S. japonica* Makino (The Bot. Mag. Tokyo, XXIII, 1909, 11) which is distinguishable by its thicker leaves (2.3–4 mm) and scarcely keeled fruiting perianth. Makino's indication concerning the scarious testa as a feature distinguishing his species from *S. maritima* L. and *S. salsa* Pall. does not stand up to criticism, since the description was based on fall specimens and merely reflects the heterocarpy which also characterizes the other two species.

Cycle 2. **Maritimae** Iljin. — Seeds prominently sculptured.

21. *S. maritima* (L.) Dumort. Fl. Belg. (1827) 22. — *Chenopodium maritimum* L. Sp. pl. (1753) 221. — *S. maritima* A. filiformis Gr. in Asch. u. Gr. Syn. V (1913) 199. — *S. filiformis* Dum. Fl. Belg. (1827) 22. — *Chenopodium filiforme* Dum., l.c. — *Chenopodium filiformis* Moq. in DC. Prodr. XIII, 2 (1849) 164. — ? *Schoberia dumortieri* Steud. Nom. ed. 2, II (1841) 532. — Ic.: Hegi Ill. Fl. Mitt. Europ. III, 257, t. 97; Lindman Svensk Fanerogamfl. (1918) 221. — Exs.: HFR no. 387; Pl. Finl. exs., no. 608 et 607.

Annual, mostly 3–25 cm high, green or grayish-green, glabrous; stem erect or ascending, simple or more often with few elongated branches in lower part, nearly always unbranched in the inflorescence; leaves 1–2.5 cm

long, convex beneath, obtuse or scarcely acutish, upright; bracts twice to several times as long as the clusters, subappressed to the stem; flowers small, in clusters of 2—5 in the axils of bracts; perianth thin, unchanged in fruit or developing small obsolescent equal tubercles on each of the segments; seeds horizontal, rotund, mostly 1—1.25 (1.5) mm in diameter, blackish-brown to almost black, glossy, markedly punctate-reticulate. July—August.

Maritime solonchaks. — European part: Lad.-Ilm. (reported by Gorter for Leningrad Region, but I have not seen any specimens of this species from the USSR). Gen. distr.: Scand., Atl. Eur., Med. ? Described from W. Europe. Type in London.

Economic importance. Used for potash extraction. The laxative properties are comparable to those of the next species. The following mineral content was established by Wehmer for the foliage of West European plants: total ash 31.57 on a dry weight basis; of this in percentages, Cl 44, Na₂O 40.8, K₂O 4.4, CaO 4.2, MgO 6.6, Fe₂O₃ 2.3, SO₃ 3, SiO₂ 2.4, P₂O₅ 2. The data for stems are: total ash 24.06, Cl 47, Na₂O 46, CaO 4.4, K₂O 3.14, MgO 2, SO₃ 3.4, Fe₂O₃ 1.3, SiO₂ 2, P₂O₅ 1.2. The ash contains also NaCl 19.3%, Na₂CO₃ 41.7, potassium phosphate 12.2, K₂CO₃ 7.5, CaSO₄ 9.3%.

194

22. *S. prostrata* Pall. Illustr. (1803) 55. — *S. maritima* α *vulgaris* Moq. Chenop. (1840) 128. — *S. maritima* auct. ross., non L. (s. str.). — *S. salsa* Pall. (p. p.) et auct. plur. — *Chenopodina maritima* α *vulgaris* Moq. in DC. Prodr. XIII, 2 (1849) 161. — *Schoberia maritima* C. A. M. in Ldb. Fl. Alt. 1 (1829) 400. — *Suaeda chenopodioides* Pall., l. c., 56. — ? *S. parviflora* Moq. Chenop. (1840) 131. — ? *Schoberia parviflora* Less. in Linnaea IX (1835), 201. — *Chenopodina prostrata* Moq. in DC. Prodr. XIII, 2 (1849) 162. — ? *C. parviflora* Moq., l. c., 165. — Ic.: Pall., l. c., t. 47. — Exs.: HFR no. 2367 a and b, 387 b.

Annual, 10—75 cm high, glabrous, light green or yellowish-green, subsequently somewhat reddening; stem erect or ascending, branching from the base; leaves semiterete, acute or the lower somewhat obtusish; bracts shorter to slightly longer than the clusters; flowers mostly perfect, 2-many in the cluster, in interrupted spiciform inflorescences; perianth globose, parted to below the middle; segments fleshy, unchanged in fruit or with rather inconspicuous tubercles equally developed on all segments and keeled and then with short triangular stellately arranged basal lobes; seeds horizontal, 1—1.5 mm in diameter, blackish-brown, glossy, punctate-reticulate, with a rather sharp margin; autumnal seeds flat, rotund, dull, tawny, strongly compressed. July—September. (Plate IX, Figure 6a—b).

Wet solonchaks; in very large numbers. — European part: M. Dnp. (Lubny), V.-Don, Bl., Crim., L. Don, Transv., L. V., Caucasus: Cisc., Dag., S. and E. Transc.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., (?) Dau.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D. Gen. distr.: W. Eur., Dzu.-Kash. Reports for other regions are dubious. Described from two locations: the valley of the small river Solyanka, a tributary of the Eruslan River in the Central Volga region, and from a locality which lies between Stalingrad [Volgograd] and Chernyi Yar. Type in London.

Note. It should be noted that the plant which I collected at two sites beside Lake El'ton — *S. macrocarpa* Moq. in Ann. Sc. Nat. 1 ser., XXIII (1831) 309 (= *S. maritima* δ *macrocarpa* Moq. Chenop. (1840) 128), differs from *S. prostrata* Pall. and *S. maritima* L. in its large flowers, and, more particularly, its seeds that are 2–3 mm in diameter. It also differs to some extent in habit and the more obtuse leaves. It is not clear whether this plant should be regarded as a separate species or merely as a variety; this problem can be settled only upon examination of a larger number of specimens. If it should prove to be merely a race, it would have to be named *S. prostrata* subsp. *macrocarpa* (Moq.) Iljin.

Economic importance. The plant is used in many places for potash extraction. It has laxative properties which disappear on boiling. It is believed to provide forage of poor quality, comparable with that of winter-rye straw (Aleksandrovskaya and Beguchev). Eaten by camels, but mostly not before fall. Analysis of vegetative specimens from the lower Volga region, carried out by these authors, gave the following percentage composition: water 19.56, ash 10.41, crude protein 8.11, albumin 7.14, crude fat 2.92, crude cellulose 27.55, nitrogen-free extract 31.45; the coefficients of digestibility for these components were 38.52, 40.90, 49.14, 34.22, and 37.03, respectively; starch equivalent was found to be 9.85. I. Larin gives the following percentage analysis for West Kazakhstan plants: water 5.97, ash 27.61–29.35, cellulose 14.22–15.12, crude protein 6.63–7.06, crude fat 2.61–2.78, nitrogen-free extract 42.96–45.69; hence starch equivalent 30.59–32.54.

23. *S. olufsenii* Pauls. Lieut. Olufsen's Second Pamir Exp. in Vidensk Meddel. fra den naturh. Foren i Kbhvn (1903) 194. — Ic.: Pauls., l. c., t. II.

Annual, glaucescent, glabrous; stems ascending, 3–25 cm long, commonly with elongated decumbent or ascending branches in lower part, unbranched or very sparsely branched elsewhere, or more rarely altogether simple; leaves oblong or oval, obtuse or minutely mucronulate, abruptly narrowing at base, remote, flat above, convex beneath, the lower to 10 mm long and 3 mm broad, the upper smaller; bracts often acutish; flowers perfect, minutely pedicellate (remove flowers!); clusters many-flowered, forming interrupted spiciform inflorescences; perianth segments hooded; bearing in fruit transversal basal protuberances, these winglike, narrowed upward, stellately expanded; stigmas 2, short, filiform; seeds horizontal, rotund or rounded-oval, 0.75–1.25 mm in diameter, rather convex, blackish-brown or black, glossy, markedly punctate-reticulate, with a sharp margin. August–September. (Plate IX, Figure 7a–b).

Shores of brackish lakes. — Centr. Asia: Pam.-Al. (Pamir). Endemic. Described from Khargushpas in the Pamir. Type in Copenhagen.

24. *S. corniculata* (C. A. M.) Bge. in A. H. P. VI, 2 (1880) 429; Il'in in Fl. Yugo-Vost. IV, 198; Shmal'g., Fl. II, 379; Kryl., Fl. Zap. Sib. IV, 940. — *Schoberia corniculata* C. A. M. in Ldb. Fl. Alt. I (1829) 399; Fenzl in Ldb. Fl. Ross. III, 791; Turcz. Fl. baic.-dah. II, 2, 44. — Ic.: Ldb. Ic. pl. fl. ross., t. 195; Sorn. rast. SSSR, II (1934) fig. 120. — Exs.: HFR no. 1237, 2368.

196 Annual, 10—50 cm high, glabrous, mostly dark green, often purple, readily turning black, commonly branching from base, with prostrate stems and branches (var. *prostrata* Bge. (= *Schoberia corniculata* α *prostrata* Bge. Reliq. Lehman. (1851) 289); more rarely ascending and then often not blackening (var. *erecta* (Bge.) Litw. in Sched. ad HFR, VII (1911) 144); leaves filiform-linear, semiterete, subacute to subobtuse, sessile; flowers in clusters of 3—9 in the axils of almost all leaves, perfect, intermixed with pistillate; perianth more or less fleshy, dissected to the middle or lower down into ovate obtusish segments; fruiting perianth with corniculate protuberance of unequal length, these more strongly developed in lateral flowers, more rarely reduced to a herbaceous pectinate transverse outgrowth; stigmas short, sessile; seeds mostly horizontal, those of the vertical central flower 1.25—1.75 mm in diameter, with a hard glossy blackish testa, markedly reticulate-punctate, those of lateral flowers 1.25—2 mm in diameter, strongly flattened, with thin scarious dull tawny smooth testa, with prominent embryo, or very rarely the seeds of the first type. July—September. (Plate IX, Figure 4).

Wet solonchaks; in groups, often of limited size. — European part: Transv.; L. V.; W. Siberia: U. Tob., Irt., Ob (S. of 56° N. lat.), Alt.; E. Siberia: Ang.-Say., Dau., Lena-Kol. (S., rare); Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Dzu.-Kash., Mong., NW Manch., W. Tibet. Described from Loktevsk, Chuya, and Semipalatinsk. Type in Leningrad.

25. *S. drepanophylla* Litw. in Sched. ad Herb. Fl. Ross. VI (1908) 109. — *S. corniculata* var. *drepanophylla* Litw., l. c., 108. — Exs.: HFR no. 1886.

Annual, 40—75 cm high, glabrous, glaucous, turning black; stem mostly erect, branching from base; branches closely approximate, upright; leaves alternate, approximate, fleshy, terete, markedly falcately upcurved, obtuse, mostly slightly thickened toward apex, shortly attenuate at base into a petiole, 10—15 mm long; bracts strongly abbreviated, the uppermost oval to suborbicular, short-petioled, often gibbous on the back; flowers in clusters of 5, strictly axillary, borne on short branchlets forming a narrowly paniculate inflorescence, perfect intermixed with pistillate; perianth fleshy; segments of fruiting perianth with shortly thick-rayed stellately arranged hoodlike tubercles and mostly, especially in lateral flowers, with unequal corniculate protuberances resembling those of *S. corniculata* Bge.; anthers rounded or rounded-oval; stigmas 2 or 3, short, sessile; seeds horizontal, more rarely oblique, some with hard blackish-brown glossy smooth finely reticulate-punctate testa, 0.75—1 mm long, others flat, yellow or tawny, with dull scarious testa and prominent embryo, 1—1.25 (1.5) mm in diameter, the two types being associated with the central and the lateral flowers of the dichasial clusters, respectively. August—September. (Plate IX, Figure 10 a—c).

Wet solonchaks. — Centr. Asia: Amu D., Syr D. Endemic. Described from Farab (Turkmenistan). Type in Leningrad.

197 26. *S. heterophylla* (Kar. et Kir.) Bge. in A. H. P. VI, 2 (1880) 429; Il'in in Fl. Yugo-Vost. IV, 199; Kryl., Fl. Zap. Sib. IV, 940. — *Schoberia heterophylla* Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 734;

Fenzl in Ldb. Fl. Ross. III, 790. — *Brezia heterophylla* Moq. in DC. Prodr. XIII, 2 (1849) 167. — Ic.: Fl. Yugo-Vost. IV, 200, fig. 277. — Exs.: HFR no. 936.

Annual, 10–80 cm high, glabrous, light green, becoming yellowish to lateritious, branching or more rarely simple; leaves filamentose, semiterete, acute to obtusish, divergent, with abbreviated branchlets in their axils; flowers mostly in clusters of 3 (1–5), perfect and pistillate, subtended by linear-lanceolate to ovate-lanceolate leaves; perianth dissected to the middle or lower down into ovate obtuse ecarinate segments; segments of fruiting perianth, especially in lateral flowers, mostly with semicircular winglike outgrowths combining into broad transversal band or in obtusely stellate arrangement of 5 rays; stigmas mostly 2, very short, sessile; seeds horizontal, in central flowers 1 mm in diameter, with firm blackish-brown reticulate-punctate testa; seeds developing in late fall and those of lateral flowers strongly flattened, 1–1.5 mm in diameter, with scarious smooth dull tawny or but exceptionally black testa and a prominent embryo. July–September. (Plate IX, Figure 5).

Wet solonchaks, salinas, mainly in areas of large concentrations of sand; in groups of often limited size. — European part: L. V.; Caucasus: E. Transc. (Garedzh Steppe) and S. Transc. (Arazdayanskaya Steppe); Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Syr D., Amu D. Gen. distr.: Iran. (Afghanistan), Dzu.-Kash., Mong., Tib. Described from Zaisan. Type in Leningrad.

27. *S. kossinskyi* Iljin in Bull. Jard. Bot. Princ. d. l'URSS, XXVI, 2 (1927) 115; Fl. Yugo-Vost. IV (1930) 200. — *S. crassifolia* Pavlov in herb. Bot. Inst. Ac. Sc. URSS. — Ic.: Fl. Yugo-Vost., l. c., fig. 278.

Annual, 5–15 cm high, glabrous, pale green or yellowish, branching from base; leaves to 5 mm broad, oval or oblong-spatulate or oblong, very fleshy, obtuse, sessile, narrowing at base; flowers in the axils of nearly all leaves, mostly in 3's, perfect and pistillate; perianth 2.5–3.5 mm in diameter, fleshy; fruiting perianth markedly transversely winged, the connivent lobes often developing 5 large tubercles; stigmas sessile, very short; seeds horizontal, 1.5–2 mm in diameter, black or blackish-brown, clearly punctate-reticulate, the pericarp adnate to lower part of perianth; some seeds flat, dull tawny. August.

Solonchaks (salinas) in the midst of large sandy areas. — European part: L. V. (Urda); Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from the vicinity of Urda. Type in Leningrad.

Note. A species related to *S. przewalskyi* from which it differs in the less spatulate leaves and more fleshy perianth with developed transversal wings.

Genus 422. **ALEXANDRA*** BGE.

Bge. in Linnaea XVII (1843) 120.

Flowers perfect, with scarious bracteoles, borne several together in the axils of long and broad bracts; perianth segments 5, united below the

* Named for Alexander Lehmann (1814–1842), renowned for his Central Asian collections, which resulted in a number of new species and genera treated by Bunge.

middle, some of them, mostly 2 or 3, with oblong dorsal wings in upper part; stamens 5, the short unappendaged anthers scarcely exerted; ovary clearly truncate, the 2 or 3 short stigmas arising from the flat top; seeds vertical, with radicle pointing downward, the embryo spiral. Annual plants with alternate simple leaves. A monotypic genus.

1. *A. lehmanni* Bge. in *Linnaea* XVII (1843) 120; *Reliq. Lehm.* (1851) 463; Fenzl in *Ldb. Fl. Ross.* III, 793. — *Pterocalyx strictissimus* Schrenk in *Bull. phys.-math. d. l'Acad. d. St. Pétersb.* I (1843) 361.

Annual, 10–50 cm high, yellowish-green, succulent, glabrous; stems simple or branching, erect; leaves sessile, entire, obtusish, the lowermost linear to linear-lanceolate, the middle oblong-lanceolate to oblong-ovate, marcescent, sessile and subappressed to the stem, the upper bracteal leaves [bracts] ovate to rounded-ovate, imbricated; flowers in groups of 3–5, enclosed by the bracts, furnished with 2 scarious lanceolate crenate bracteoles; perianth segments 2, more rarely 3 or very rarely 4, oblongly winged, the wings fully developed on mostly 2 segments, usually with a fimbriate-toothed margin; seeds ca. 1 mm long, subrotund to ovate, compressed, blackish-brown, glossy, subobsoletely reticulate, with a prominent radicle. (Plate X, Figure 4).

Solonchaks, mostly puffy; in groups. — Centr. Asia: Ar.-Casp. (E. part), Balkh., Kyz. K., Syr D. (?). Endemic. Described from the Barsuki sands north of the Aral Sea. Type in Leningrad.

199

Genus 423. **BORSZCZOWIA** * BGE.

Bge. in *A. H. P. V.*, 2 (1878) 643; VI, 2 (1880) 424.

Flowers unisexual, the plants monoecious; staminate flowers small, in small numbers among the pistillate, with 5 obtuse short scarcely hooded lobes; stamens 5, with rounded-oval unappendaged anthers; a rudimentary pistil present; pistillate flowers in groups of several in the axils of cauline and ramal leaves, occurring in two forms, some smaller, subpyriform, with fleshy perianth 3–5-toothed at summit, others much larger, obovoid, strongly compressed laterally and slightly vertically winged, in both forms the perianth adnate to ovary, berrylike in fruit by fusion with pericarp; ovary with 2 or 3 short subulate sessile stigmas; seeds vertical, with spiral embryo, almost exalbuminous, displaying heterocarpy, in the small flowers obovate, with brittle black glabrous glossy testa, in the large compressed flowers brown or olivaceous, dull, with prominent embryo; bracteoles scarious, pellucid, ovate to oblong-ovate, denticulate, shorter than perianth. A monotypic genus.

1. *B. aralocaspica* Bge. in *A. H. P. V.*, 2 (1878) 643 and VI, 2 (1880) 424. — *Schanginia borszczowii* Bge. in Borshchov, *Mater. dlya Bot. geogr. Ar.-Kasp. kraya* (1865) 42 and 150 (nomen).

Annual, 10–40 cm high, glabrous, branching from the base; stems mostly decumbent, more rarely ascending or suberect, whitish, lustrous,

* Named for I. Borshchov (1833–1878), renowned for his studies of the Aral-Caspian region.

fragile; leaves fleshy, semiterete, obtuse, slightly narrowing at base, the upper shorter, all somewhat arched-upcurved at base; flowers glomerate, both in the leaf axils and at the tips of stems and branches; fruiting perianth accrescent, in largest flowers attaining pea size and tightly enclosing the fruit; seeds large, flat, brown, up to 2.5—3 mm in diameter, or black and much smaller, rarely reaching 2.5 in diameter. August. (Plate X, Figure 5 a, b).

Solonchaks, salinas, and takyrs. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K. Endemic. Described from the lower course of the Emba River, near the NE shore of the Caspian Sea. Type in Leningrad.

Note. *B. titovii* Eug. Kor (ined.), reported for the Lake Balkhash area, does not differ from the species described.

Genus 424. **BIENERTIA** * BGE.

Bge. in Boiss. Fl. Or. IV (1879) 945.

200 Flowers perfect or pistillate, with scarious bracteoles, the former occurring commonly in summer, the latter in fall, 5-merous; perianth fleshy; segments of fruiting perianth connivent, with a winglike band below their juncture always developed in pistillate flowers and only partly in perfect ones; stamens 5, with unappendaged anthers; stigmas 2 or 3, short, claviform; fruits horizontal; seeds with spiral embryo and very scanty endosperm, of two sorts, the early convex, with hard black glossy testa, the fall-produced flat, tawny and almost dull. Annual plants with simple alternate leaves. A monotypic genus.

1. *B. cycloptera* Bge. in Boiss. Fl. Or. IV (1879) 945; Il'in in Fl. Yugo-Vost. IV, 204. — *Schanginia baccifera* Fenzl (ex parte) in Ldb. Fl. Ross. IV (1851) 776. — *Schoberia baccifera* C. A. M. in Hohen. Enum. Talysch (1838) 357. — *Schoberia cycloptera* Bge. ex Trautv. in Bull. Soc. Nat. Mosc. XL, 3 (1867) 64. — *Bienertia lipskyi* Fom. in Opr. rast. Kavkaza i Kryma II, 2 (1914) 137. — Ic. — Fl. Yugo-Vost. IV, fig. 281. — Exs.: HFR no. 388.

Annual, 10—40 cm high, glabrous, succulent, branching from the base; stem erect or ascending, becoming apparently winged on drying; leaves linear, terete, succulent, obtuse, adnate to some extent to the branches so that these seem to arise from the lower part of the leaf; flowers in axillary clusters, finally borne on short peduncles apparently arising from the leaf base; in early fruits the winglike rim of the fruiting perianth mostly confined to lateral ones, in the case of fall-produced fruits generally present; stamens not prominent; seeds rotund, 1.5—2.5 mm in diameter. June—September. (Plate X, Figure 3).

Gypsiferous solonchaks; in groups or in compact thickets. — European part: L. V.; Caucasus: E. and S. Transc.; Centr. Asia: Ar.-Casp., Balkh. (W.), Mtn. Turkm. Gen. distr.: Arm.-Kurd., Iran. Described from E. Iran. Type in Leningrad.

Economic importance. According to I. A. Linchevskii, a forage plant, apparently for camels.

* Named for Bienert, Bunge's companion and assistant in his Iranian travels.

Tribe 10. **SALSOLEAE** C. A. M. in Ldb. Fl. Alt. I (1829) 370 (incl. Anabaseae).
 — Bracteoles herbaceous; embryo spiral.

Genus 425. **SALSOLA*** L.

L. Sp. pl. ed. 1 (1753) 222; Gen. pl. ed. 5 (1754) 104.

Flowers perfect, 5-merous, mostly solitary or rarely more in the leaf axils, forming together a spiciform inflorescence; fruiting perianth with winglike mostly horizontally spreading protuberances, these sometimes reduced to pectinate ridges; stamens 5, the anthers terminating in variously shaped scarious or bladdery appendages or unappendaged; stigmas 2, sessile or borne on a long style; fruits horizontal or oblique or vertical; seeds with spiral embryo. Annuals, undershrubs, shrubs, or trees, with narrow or rarely broad, mostly alternate entire leaves. The genus contains about 120 species. Russian name: solyanka.

1. Stigmas sessile, very short (a fraction of 1 mm), subulate; fruit baccate; plants glabrous; leaves claviform (Section 10. *Cocco-salsola* Fenzl) 72. *S. foliosa* (L.) Schrad.
- + Stigmas borne on a style, much longer than in the preceding species; fruit not baccate 2.
2. Locules of anthers distinct up to the appendage; appendages lanceolate or oblong-ovate, acuminate (Section 9. *Belanthera* Iljin) 3.
- + Locules of anthers united at least in upper part (see, however, the series *Sogdianae* Iljin of the section *Kali* Ulbrich); appendages of anthers obtuse 12.
3. Annual plants 4.
- + Undershrubs 6.
4. Buds obconical, densely clothed with loose tomentum; stems often dark brown; wings of perianth orange or sanguine 70. *S. gossypina* Bge.
- + Plants different from above, with spreading bristlelike hairs 5.
5. Plants farinose, sparsely covered with bristlelike articulate hairs; leaves acute 69. *S. forcipitata* Iljin.
- + Plants not farinose, covered with long articulate bristles and numerous dense short silky hairs; leaves obtusish 68. *S. vvedenskyi* Iljin et M. Pop.
6. Plants, especially the globular buds, covered with 2-pointed pellucid scales 7.
- + Plants without such scales 8.
7. Stigmas subulate, acute. Caucasus 62. *S. nodulosa* (Moq.) Iljin.
- + Stigmas obtuse. Central Asia 63. *S. gemmascens* Pall.
8. Plants pale green, glabrate; perianth glabrous; stigmas many times as long as style 71. *S. daghestanica* (Turcz.) Lipsky.
- + Plants canescent; perianth hairy; stigmas slightly shorter than or 1—1.5 times as long as style 9.
9. Plants fragile; appendages of anthers covered with obsolescent acute papillae; stems and leaves covered with short appressed hairs; seeds always vertical 10.

* A plant name first used by Cesalpino, given, in allusion to salty taste, to *Halogeton sativus* which was earlier included in the genus *Salsola* (Ulbrich).

- + Plants not fragile; stems and leaves covered with branched aculeate hairs; seeds horizontal or oblique 11.
- 10. Leaves shortly dilated at base, constricted above the dilated part.
Kopet Dagh 65. *S. aucheri* (Moq.) Bge.
- + Leaves without constriction. Caucasus 64. *S. cana* C. Koch.
- 11. Stems and leaves covered with very short branched (substellate) hairs 67. *S. stellulata* Eug. Kor.
- + Stems and leaves covered with longer subappressed aculeate hairs 66. *S. takhtadshjanii* Iljin.
- 12. Leaves shortly dilated at base and constricted above the dilated part; anthers with small sessile scarious appendages (Section 5. *Anchophyllum* Iljin) 13.
- + Leaves without constriction 23.
- 13. Leaves more or less hairy 14.
- + Plants glabrous, or covered with stiff acute papillae or with short bristles 15.
- 14. Shoots of this genus simple; stigmas long, several times the length of the short style, long-villous, arched-recurved. Tadzhikistan 47. *S. baranovii* Iljin.
- + Shoots of the current year branched; stigmas short, thick, erect, short-villous, shorter than to as long as the style. Tien Shan 46. *S. roshevitzii* Iljin.
- 15. Lobes of fruiting perianth tightly appressed to fruit, forming in the middle of the fruit a marked depression with a short central tubercle protruding above the lobes; stigmas obtuse . . . 42. *S. chiwensis* M. Pop.
- + Lobes of fruiting perianth connivent into a short cone or appressed to the fruit in lower part and rosulately spreading above; stigmas acuminate 16.
- 16. Perianth segments pale, faintly yellowish or in the middle part yellowish-green 17.
- + Perianth segments darkish, smoke-colored or smoky-roseate . . . 20.
- 17. Perianth including wings 5—7 mm across; a fine shrublet with slender branches. Alai 40. *S. montana* Litw.
- + Perianth including wings 8—14 mm across; coarser undershrubs with stouter branches 18.
- 18. Lobes of fruiting perianth rising abruptly to a rather steep cone . . 19.
- + Lobes of fruiting perianth appressed in lower half to the fruit, scarious and more or less divergent above 37. *S. arbuscula* Pall.
- 19. Dwarf plants, spiny-branched, mostly with whitish bark in the inflorescence; leaves pale green, short, clustered; perianth not more than 5 mm long 39. *S. laricifolia* (Turcz.) Litw.
- + Taller plants; axils of inflorescence green; leaves longer, glaucous; flowers larger 38. *S. arbusculaeformis* Drob.
- 20. Leaves flat, 2—3 mm broad, densely covered with small sharp tubercles, the obtuse midrib prominent beneath 45. *S. transhyrcanica* Iljin.
- + Leaves terete to subtrigonus-terete, glabrous or minutely hirtellous but not tubercled or pustulose 21.
- 21. Small shrubs or undershrubs, to 50 cm high; leaves 10—30 mm long; perianth including wings 6—9 mm in diameter. Stony habitats 41. *S. maracandica* Iljin.

- + Trees or tall shrubs; leaves subfiliform, 30—80 mm long; perianth including wings 10—20 mm in diameter. Sands 22.
22. Arborescent plant with slender, strongly drooping, weeping branches; perianth including wings 15—20 mm in diameter; wings pale, silky-lustrous 44. *S. palezkiana* Litw.
- + Branches not weeping; perianth including wings mostly 10—15 mm in diameter, rarely larger; wings mostly rosy-purple, rarely paler, sometimes silky-lustrous 43. *S. richteri* Kar.
23. Plants glabrous or covered with short setaceous papillae; leaves acute or acuminate, but not terminating in a spine or bristle; anthers without scarious or bladdery appendages; stigmas enlarged and scarious at tips and here fimbriate-toothed (Section 6. *Sphragidanthus* Iljin.) 24.
- + Leaves muticous or bristle-tipped or pungent (see, however, *S. mutica*, *S. olgae*, *S. brachiata*); stigmas not dilated at tips or, if dilated, then the plants farinose 28.
24. Annuals; wings rather stoutly keeled, thus the perianth apparently stellately 5-rayed 51. *S. iliensis* Lipsky.
- + Undershubs or shrubs or low trees 25.
25. Shoots, especially toward the ends, and leaves densely covered with barely perceptible setiform papillae 50. *S. hispidula* Bge.
- 204 + Shoots and leaves glabrous 26.
26. Bracts and bracteoles much shorter than perianth; divaricately branching plants 27.
- + Bracts and bracteoles equaling or surpassing the perianth; branches obliquely ascending; plants always glaucous 49. *S. glauca* M. B.
27. Glaucous plants 48. *S. subaphylla* subsp. *strangulata* Iljin.
- + Green plants 48. *S. subaphylla* C. A. M.
28. Annual plants; leaves bristle-tipped or mucronate, very rarely obtuse in which case the leaves subclaviform; axillary clusters 3-flowered (*S. mutica* C. A. M.); anthers unappendaged, or with minute or firm sessile but not scarious appendages (Section 1. *Kali* (Adans.) Ulbrich) 29.
- + Leaves always muticous (see, however, *S. olgae* Iljin, *S. brachiata* Pall.) 46.
29. Lobes of fruiting perianth segments spiny-tipped or apiculate-spinous and gathered into a beak or soft but slenderly long-pointed 30.
- + Lobes of fruiting perianth segments muticous, soft, scarious, often apparently crumpled (see, however, *S. tamariscina*) 34.
30. Plants densely chaffy-hispidulous; perianth segments stiff, cuspidate or short-acuminate. Baltic coast 3. *S. kali* L.
- + Plants glabrous or else roughened with papilliform tubercles or minutely hispidulous but not chaffy; perianth segments long-acuminate 31.
31. Fruiting early, May to beginning of June 6. *S. praecox* Litw.
- + Fruiting late, August to September 32.
32. Lobes of fruiting perianth soft; fruit including wings 15—18 mm across. Armenia 9. *S. tamamschjanae* Iljin.
- + Lobes of fruiting perianth stiffly spinous; fruit including wings 6—12 mm across. Central Asia and the Caspian coast of the Caucasus 33.



PLATE X. 1. *Horaninovia ulicina* Fisch. et Mey.: a) branch, b) inflorescence, c) flower, d) stamen.—
 2. *H. minor* Fisch. et Mey.: a) branch, b) stamen.— 3. *Biénertia cycloptera* Bge.: perianth.—
 4. *Alexandra lehmanni* Bge.— 5. *Borszczowia aralo-caspica* Bge.: a) branch, b) perianth.—
 6. *Arthrophytum iliense* Iljin: a) branch, b) fruiting perianth.— 7. *A. subulifolium* Schrenk.—
 8. *Iljinia regelii* (Bge.) Eug. Kor.— 9. *Haloxylon persicum* Bge.: a) vegetative shoot, b) flowering
 branchlet, c) fruiting perianth.— 10. *H. aphyllum* (Minkw.) Iljin : vegetative shoot.

33. Leaves coriaceous, persistent, yellowish, vividly contrasting with the mostly purple or roseate stem 7. *S. paulseni* Litw.
 + Leaves soft, the lower mostly deciduous, darker; green plants
 207 8. *S. pellucida* Litw.
34. Locules of anthers divergent right up to the appendage, this firm, ovate, sessile, concolor with anther, and mostly slightly recurved; young shoots commonly rufous-tinged 35.
 + Appendages of anthers always fused at summit, unappendaged or with a minutely barely perceptible appendage 38.
35. Plants glabrous; leaves on the main stem 15—80 mm long, often flat; tips of the lobes of fruiting perianth abruptly recurved in 5-rayed stellate arrangement with an aperture at center, often caducous 36.
 + Plants densely beset with short sharp papillae; leaves 5—10 mm long (except the promptly deciduous lowermost, these 15—20 mm long), very numerous and closely approximate; tips of the lobes of fruiting perianth completely covering the fruit, gathered into a loose beak, persistent 37.
36. Leaves linear-filiform, semiterete, 1—2 mm in diameter; the stellately spreading tips of perianth segments with central aperture not more than 1 mm in diameter 15. *S. sogdiana* Bge.
 + Leaves linear, flat or canaliculately folded, 2—10 mm broad; the stellately spreading tips of perianth segments with central aperture ca. 3 mm in diameter 16. *S. aperta* Pauls.
37. Plants narrowly pyramidal. W. Tadzhikistan . . . 17. *S. androssovii* Litw.
 + Plants widely bushy. Kara-Kalpak ASSR (Kyzyl-Kum Desert)
 18. *S. deserticola* Iljin.
38. Fruiting perianth elongated, cup-shaped, apparently truncate at summit, with pectinate marginal projections; plants always glabrous; lower leaves mostly opposite (see, however, *S. komarovii*) 39.
 + Fruiting perianth almost flat or the shape of a low reversed dome; lower leaves alternate or only 1—3 pairs opposite 41.
39. Lower leaves 2.5—7 cm long; bracts dilated in lower part, attenuate above, mostly subtending but one fully developed flower 40.
 + Lower leaves 1—2 cm long; bracts dilated throughout, mostly subtending 3 equally developed flowers 13. *S. mutica* C. A. M.
40. Lower leaves 3—8 opposite pairs; branches obliquely ascending. Europe and Central Asia 12. *S. soda* L.
 + Lower leaves not more than 1—3 opposite pairs, declinate; branches strongly spreading. Far East 14. *S. komarovii* Iljin.
- 208 41. Plants always glabrous, glaucous; leaves and especially bracts not bristle-tipped, merely terminating in a short point or rather an acute tubercle 42.
 + Leaves and bracts always terminating in a short bristle 43.
42. Bracts shorter than to scarcely longer than bracteoles; leaves 5—15 mm long; lobes of fruiting perianth ecarinate, completely covering the fruit and connivent in a beak 10. *S. tamariscina* Pall.
 + Bracts much longer than bracteoles, arcuate; leaves 10—30 mm long; lobes of fruiting perianth distinctly keeled, not covering the fruit and fully appressed to it 11. *S. rosacea* L.

43. Inflorescence long, slender, spiciform, with appressed bracts and bracteoles, always more or less covered with very short bristles, and in lower part usually with caducous gall-like flowers 4. *S. gollina* Pall.
+ Inflorescence with always more or less divergent bracts and bracteoles 44.
44. Leaves numerous, closely approximate, long, filiform; flowers very small, concealed in the axils of long bracts and bracteoles, with a single wing facing the bract or more rarely with an additional adaxial wing, 1—1.75 mm in diameter including the wing. Altai 5. *S. monoptera* Bge.
+ Plants different from the above; flowers larger 45.
45. Plants pale green, glabrous, stout; leaves thickish; bracts short and thick, inflated at base; bracteoles united at base; flowers always wingless 2. *S. tragus* L.
+ Plants glabrous or scabrous or setulose; bracts not inflated at base; flowers winged or wingless 1. *S. ruthenica* Iljin.
46. Leaves decurrent; perianth including wings 10—20 mm in diameter; appendages of anthers always bladdery and short-stipitate (Section 2. *Physurus* Iljin) 47.
+ Leaves not decurrent; perianth including wings 3—12 mm in diameter; anthers unappendaged or with small ovate sessile appendages and then plants farinose, or else anther appendages spatulate or oval or oblong-ovate, scarious, not bladdery 62.
47. Style several to many times as long as stigmas 48.
+ Style as long as or shorter than or rarely 1.5 times as long as stigmas 51.
48. Style subserpentine, very strongly exerted 20. *S. longistyla* Iljin.
+ Style not exerted, at most the stigma protruding from the perianth 49.
49. Perianth glabrous; the upper part of the plant glabrate or with scattered hairs or groups of hairs 21. *S. kasakorum* Iljin.
+ Perianth hairy 50.
50. The upper part of the plant uniformly hairy; stigmas very short; style many times as long as stigmas 19. *S. lanata* Pall.
+ The upper part of the plant glabrous or nearly so; style only 2—4 times as long as stigmas 22. *S. bucharica* Iljin.
51. Undershrub; leaves and, more particularly, the bracts, acutish 34. *S. olgae* Iljin.
+ Annuals; leaves obtuse 52.
52. Appendages of anthers yellow 53.
+ Appendages of anthers white or roseate 55.
53. Perianth, like the whole plant, covered with short hairs 30. *S. minkvitzi* Eug. Kor.
+ Perianth glabrous 54.
54. A yellowish-green, relatively tall plant; wings inserted below the middle of perianth segments, the lobes of fruiting perianth forming a tall beak constricted at the middle; appendages of anthers bright yellow 32. *S. heptapotamica* Iljin.
+ A low glaucous plant; wings inserted at the middle, the segments above them forming a short and rather loose closed beak; appendages of anthers yellow 31. *S. turgaica* Iljin.

55. Stigmas sessile or at least 3—4 times as long as the style 56.
 + Stigmas 1—1.5 times or only two-thirds as long as the style 59.
56. Plants hairy up to the summit; perianth hairy 57.
 + Plants glabrous in upper part 58.
57. Plants glaucous, covered throughout with a lining of very short spreading hairs and usually with a fine tomentum of firmly appressed hairs, these often fugacious in upper part 33. *S. turkomanica* Litw.
 + Plants with whitish stems and branches, densely covered throughout with soft tangled hairs forming a loose unlined coat 29. *S. lachnophylla* Iljin.
58. Perianth hairy. Turkmenistan 25. *S. transoxana* Iljin.
 + Perianth glabrous. Zaisan 24. *S. subcrassa* M. Pop.
59. Perianth hairy 26. *S. korshinskyi* Drob.
 + Perianth glabrous 60.
60. Stem covered at first with long tangled hairs, subsequently often glabrescent, without short spreading hairs 23. *S. crassa* M. B.
 + Stem covered throughout or merely at the nodes with spreading hairs 61.
61. Plant 30—75 cm high; branches upright, glaucous-purple, covered throughout with spreading hairs; flowers in dense spiciform inflorescences, their wings contiguous; perianth including wings 10—14 mm in diameter 27. *S. aralensis* Iljin.
 + Plant 15—45 cm high; the declinate branches and the stem in lower part and at the nodes covered with spreading hairs; flowers in a scattered spiciform inflorescence, their wings mostly discontinuous except at the summit of the flower; perianth including wings 15—17 mm in diameter 28. *S. intricata* Iljin.
62. Anthers with ovate or spatulate or oval appendage; bracts and leaves not tubercled at base 63.
 + Anthers unappendaged or obsoletely appendiculate; bracts and often leaves slightly attenuate below, the attenuated base appressed to the stem (Section 7. *Caroxylon* Iljin) 66.
63. Plants farinose and covered, especially in lower part, with tangled hairs; leaves deciduous at fruiting (Section 8. *Aleuranthus* Iljin) 64.
 + Plants not farinose, covered with short straight hairs sometimes interspersed with long ones; leaves persistent 65.
64. Flowering perianth 1.5—2.5 mm long, the wings broadest in lower or middle part, mostly acute; lobes of fruiting perianth appressed to the fruit and not covering it at the center . . . 61. *S. carinata* C. A. M.
 + Flowering perianth 3—5 mm long, the wings broadest in upper part, obtuse, attenuated toward base; lobes of fruiting perianth connivent into a cone 60. *S. sclerantha* C. A. M.
65. Leaves acute, opposite except the uppermost; stem covered with short hairs interspersed with long ones; stigmas sessile; seed vertical 36. *S. brachiata* Pall.
 + Leaves obtuse, alternate except the lowermost 1—3 pairs; all hairs short; stigmas as long or at most 1.5 times as long as style; seeds mostly horizontal, more rarely vertical . . . 35. *S. affinis* C. A. M.

- 11 66. Annuals 67.
+ Undershubs 69.
67. Fruiting plants glabrous or nearly so in upper part; perianth
glabrous 68.
+ Fruiting plants rather densely covered with short hairs; perianth
hairy 57. *S. incanescens* C. A. M.
68. Lobes of fruiting perianth connivent into a cone; perianth including
wings 6—7 mm in diameter; stigmas short, thickish, mostly shorter
than style. Caucasus 56. *S. macera* Litw.
+ Lobes of fruiting perianth appressed to fruit, more rarely forming a
very gently sloping cone; perianth including wings 7—10 mm in
diameter; stigmas filiform, about as long as style
. 55. *S. nitraria* Pall.
69. Plants developing a short often stout woody stem giving rise to long
annual shoots 70.
+ Undershubs branching at base, with slender woody branches 71.
70. Plants glaucous or glaucescent, often turning black on drying, finely
and rather sparsely hairy, subsequently glabrate. Caucasus
. 59. *S. ericoides* M. B.
+ Plants not glaucous but always grayish with short dense crisp hairs
often interspersed with long ones, not blackening
. 58. *S. dendroides* Pall.
71. Woody branchlets beset with reduced tuberclelike shoots, resembling
peripheral branchlets of larch; mostly pale green plants, at first
densely hairy, finally glabrate 54. *S. laricina* Pall.
+ Plants with no such branches, mostly canescent 72.
72. Leaves 5—10 mm long, ascending, sometimes almost glabrous; fruiting
perianth glabrate, 3—6 mm in diameter including wings; anthers
unappendaged; stigmas linear-subulate, as long as style
. 53. *S. dshungarica* Iljin.
+ Leaves more spreading, always hairy; perianth hairy, 7—10 mm in
diameter including wings; anthers with an obsolescent appendage;
stigmas thickish, flat, shorter, often but half the length of the style
. 52. *S. rigida* Pall.

Section 1. *KALI* (Adans.) Ulbrich in Engl. u. Prantl, Pflanzenfam., 2 Aufl.
16 c (1934) 564; Dumort. Fl. Belg. (1827) 22; *Kali* Adans. Fam. II (1763)
26; Moq. in DC. Prodr. XIII, 2 (1849) 179 (pro parte). — Leaves terminating
in a bristle or a short point; plants glabrous or else covered with very
short bristles or acute tubercles, but always destitute of true hairs;
stigmas filiform, always longer than style.

212 Series 1. *Ruthenicae* Iljin. — Anthers with locules fused in upper part,
unappendaged; seeds horizontal; fruit flat (cupola-shaped).

1. *S. ruthenica* Iljin in Sorn. rast. SSSR, II (1934) 137. — *S. kali* β
angustifolia Fenzl in Ldb. Fl. Ross. III, 2 (1851) 793. — *S. kali* auct.,
non L. — Ic.: Pall. Illustr. t. XXVIII et XXIX (sub *S. kali*); Sorn. rast.
SSSR, II (1934), fig. 127. — Exs.: HFR no. 2432 and 2433.

Annual, 5—100 cm high, branching from the base, rather rigid, glabrous or roughened with very short papilliform bristles; leaves alternate, filiform-terete, spinescent, sessile, mostly slender, sometimes thickish; flowers solitary in a spiciform inflorescence; perianth segments glabrous; segments of fruiting perianth with scarious colorless or roseate or coriaceous wings or pectinate protuberances, the entire perianth 3—10 mm in diameter; lobes above the wings or outgrowths thinly scarious, obtuse, covering the fruit at the broad base, connivent at center and here apparently crumpled by drying up; stamens unappendaged; stigmas filiform, 3—4 times as long as style; seeds horizontal. July—September. (Plate XI, Figure 1).

Sands, sandy steppes, shore bluffs, cultivated fields, vineyards, gardens, and ruderal sites; in groups or scattered, also solitary. — European part: U. Dnp., M. Dnp., U. V. (sporadically), V. -Don, Bl., Crim., L. Don, Transv., L. V.; Caucasus: Cisc., Dag., S. and E. Transc.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say, Dau.; Centr. Asia: Ar.-Casp.; in other regions everywhere, but sporadically as adventive. Gen. distr.: Centr. Eur. (rare), Med., As. Min., Arm.-Kurd., Mong., N. China.

Note. We include under *S. ruthenica* various races not yet explored in detail. Here belong first and foremost: 1) *S. pseudotragus* (Beck) Iljin (= *S. kali* λ *pseudotragus* Beck in Rchb. Ic. Fl. Germ. XXV (1909) 172. — *S. gmelini* Rouy in Rouy u. Foucaud, Fl. France XII (1910) 65. — *S. pestifer* A. Nelson New. Man. Bot. Centr. Rocky Mts. (1909) 169. — *S. kali* var. *rosacea* Pall. Illustr. (1803) 36) — a plant widely distributed in steppes of the European part of the USSR, W. Kazakhstan, and in the Caucasus; in Central Asia merely as a sporadic weed; characterized by glabrous stems and leaves, well developed thinly scarious perianth wings, and long mostly slender spiciform inflorescence (varieties distinguished: var. *splendens* Litw. in Sched., l. c. and var. *virgata* Litw., l. c.); 2) *S. pontica* (Pall.) Iljin, l. c. (= *S. kali* var. *pontica* Pall. Illustr. (1803) 37), occurring more rarely in the southern regions of the European part of the USSR and in the Caucasus, distinguishable by their scabrous stems and leaves, wingless or scantily winged perianth, and frequent occurrence of globular caducous flowers, often reminiscent of *S. collina* Pall.; 3) *S. altaica* (C. A. M.) Iljin, l. c. (= *S. kali* var. *altaica* C. A. M. in Ldb. Fl. alt. I (1829) 393; *S. ircutiana* Gandoger in Bull. Soc. Bot. France XIII (1913) 421) — growing in S. Siberia and penetrating into Central Asia as far as Tien Shan, related to the preceding race, but the plants often more glabrous, with short spiciform inflorescence, mostly arched-upcurved bracts, and small subcoriaceous wings; 4) *S. aperta* Iljin in Mat. Komiss. eksp. issl. Akad. Nauk SSSR, 26 (1930) 283, along the Caspian seaboard, with intensely glaucous, thickish, mostly hispid stems and leaves, often red-striped, rarely glabrate, and always wingless perianth. Hybrids are formed in areas of contact between these races as well as between them and the species *S. collina* Pall., *S. pellucida* Litw., and *S. paulseni* Litw. A little-explored race, akin to *S. microkali* M. Pop., established by M. G. Popov for Kashgaria, occurs in the Pamir. This is a small pink-striped plant, with inflated fruiting perianth, bracts and bracteoles becoming woody at base, and roseate wings.

Economic importance. A weed widely distributed through the southern regions, often used for fuel in desert areas. It is sometimes cut before reaching the fruiting stage and used as winter feed for camels; it is suitable for ensilage and can then be eaten whole (I. Larin). It provides a domestic source of potash for soap making. The ash is used for dyeing homemade wool (Rollov). Analysis of plants before flowering (subsp. *pseudotragus*) from W. Kazakhstan (Bukei district) gave the following percentage composition for air-dry material: water 9.23, crude protein 5.10, albumin 3.97, fat 1.24, cellulose 16.45, nitrogen-free extract 27.91; starch equivalent 29.70 (with initial moisture content) and 32.72 (for absolutely dry weight); ratio of protein to nitrogen-free extract 1:12. The nutritive value of this plant declines at fruiting time, as indicated by analyses for the same region: crude protein 4.62, albumin 3.56, fat 0.73, cellulose 10.31, nitrogen-free extract 22.82; starch equivalent for dry weight 20.36; ratio of protein to nitrogen-free extract 1:10 (Zhugina and Salin, under the name *S. kali*). Goebel reports that young plants, under the name *S. kali*, from the Astrakhan Steppe had an ash content of 25%, of which 53% was water soluble. The percentage composition of the ash was as follows: K_2SO_4 5.6121 g, KCl 3.3715, K_2CO_3 0.9685, Na_2CO_3 34.0919, free sodium bicarbonate 5.1407; other components included SO_3 2.5779, CO_2 14.4009, Cl 1.6003, K 5.8243, and Na 25.0671.

2. *S. tragus* L. Sp. pl. ed. 2 (1762) 322. — *S. kali* β *tragus* Moq. in DC. Prodr. XIII, 2 (1849) 187. — *Kali tragus* Scop. Fl. Carn. ed. 2, 1 (1772) 175. — *Salsola kali* var. *glabra* Forsk. Fl. Aeg. Arab. (1775) 54 — *S. kali* α *crassifolia* lusuz 2. Fenzl in Ldb. Fl. Ross. III, 2 (1851) 798. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 293, f. 7–9.

Annual, 10–50 cm high, stoutish, glabrous, densely branched, the lower branches elongated; leaves alternate, thickish, stiff, almost semiterete, strongly spinous, spreading; bracts shorter, thick, their basal portion becoming strongly inflated in fruit, decurrent and united with the base of the declinate fruiting bracteoles which surpass the flower; flowers solitary, with stiffish perianth segments, in fruit 2–4 mm in diameter, closed and capsulelike, truncate and flat-topped; segments of fruiting perianth wingless or else with crested or more rarely almost winglike outgrowths at the summit of the "capsule," the tips of the segments scarious and crumpled; anthers unappendaged; stigmas filiform, longer than style; seed horizontal. August–September. (Plate XI, Figure 2).

Sandy and stony seashores. — European part: Bl., Crim.; Caucasus: W. Transc., along the Black Sea coast, Tal. ?; Centr. Asia?: Kara K. (Caspian coast). Gen. distr.: seacoasts of Atl. Eur. and Med. Described from S. part of W. Europe. Type in London (?).

Economic importance. The ash contains potassium (but no sodium) salts, a large amount of calcium bicarbonate (ca. 40%) and phosphates (Wehmer).

3. *S. kali* L. Sp. pl. (1753) 222. — *S. kali* α *baltica* Zapalow. Consp. Fl. Galic. crit. II (1908) 179. — *S. kali* var. *hirsuta* Hornem. Econ. pl. ed. 3 (1821) 293. — *S. kali* var. *polysarca* G. F. Mey. in Hannov. Magaz. (1824) 177. — *S. kali* var. *vulgaris* Koch, Synops. ed. 2 (1843) 693. — *S. kali* var. *typica* Beck. in Rchb. Ic. Fl. Germ. XXIV (1908) 172. — *S. kali* var.

crassifolia Fenzl lus 1. Fenzl in Ldb. Fl. Ross. III, 2 (1851) 798. — ? *S. turgida* Dum. Fl. Belg. (1827) 23. — Ic.: Rchb., l. c., t. 292; Fedch. and Fler., Fl. Evr. Ross, fig. 264. — Exs.: HFR no. 2431; Meinsh. Herb. Fl. Ingr., no. 526.

Annual, 5—40 cm high, with long prostrate or ascending branches from base, densely covered with short scarious bristles; leaves alternate, spinescent, somewhat thickish, flat, deflexed; bracteoles spinescent, longer than flower, deflexed in fruit; flowers solitary; segments of fruiting perianth mostly wingless or with wings reduced to pectinate or opaque stiffish usually unequally incised whitish or roseate winglike appendages; fruiting perianth including appendages 4—6 (7) mm in diameter; lobes above the appendages acuminate or cuspidate, stiffish like the tip except for a scarious rim on the sides, connivent into a steep cone; stigmas longer than style; seed horizontal. July—August.

Sandy seashores. — European part: Lad.-Ilm. (shores of Gulf of Finland). Gen. distr.: coasts of W. Europe. Described from W. Europe. Type in London.

Economic importance. The plant contains a large amount of sodium salts and calcium as well as oxalic acid. The ash of East Prussian specimens was found to contain in percentages: potassium 20.88, calcium 17.81, magnesium 3, aluminum 1.54, iron 1.5, sodium 0.45, PO_4 5.88, SO_4 6.39, Cl 2, CO_3 and SiO_3 40 (Wehmer). Used for potash extraction.

- 215 4. *S. collina* Pall. Illustr. (1803) 34; Fenzl in Ldb. Fl. Ross. III, 800; Turcz., Fl. baic.-dah. II, 2, 46; Shmal'g., Fl. II, 380; Kryl., Fl. Zap. Sib. IV, 949; Il'in in Fl. Yugo-Vost. IV, 215. — *S. kali* var. *angustifolia* auct. plur., non Fenzl. — *S. erubescens* Schrad. in Ann. Sc. Nat. sér. II, VI (1836) 100. — Ic.: Pall., l. c., tab. 26; Fl. Yugo-Vost. IV, fig. 284. — Exs.: HFR no. 2372 a. — Vernacular name: katun.

Annual, 10—100 cm high, rarely lower (*f. humilis* Turcz., l. c.), hirsutulous, especially on the leaves, either rather densely (*f. subhirta* C. A. M.) or very sparsely and diffusely (*f. glabra* C. A. M. in Ldb. Fl. Alt. I (1829) 333 = *f. elata* Turcz., l. c.), mostly patulous-branched; leaves alternate, filiform-terete, somewhat dilated at base, terminating in a cartilaginous cusp; flowers in a long compact spiciform inflorescence; bracts very short, almost subulate, the strongly dilated base appressed to the rachis; bracteoles somewhat shorter and narrower; perianth segments glabrous, oblong, obtuse, scarious, mostly crenulate; short inconspicuous coriaceous winglike outgrowths, these often 2-lobed or pectinate; segments above the wings scarious, attenuate from a broad base and covering the fruit, below the wings becoming cartilaginous, connate and united with the base of bracteoles, in extraspicate flowers forming bracteate caducous balls; stigmas filiform, 4—5 times as long as style; seeds horizontal, ca. 2 mm in diameter. July—September. (Plate XI, Figures 3 and 4).

Steppe plant communities and sands; as a weed in cultivated and old fields, and on ruderal sites in the forest steppe and steppe belts. — European part: V.-Don (E.), V.-Kama (E.), Transv.; in other regions only adventive; W. Siberia: U. Tob., Irt., Ob (S.), Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Uss.; Centr. Asia: Balkh (E.). Gen. distr.: Dzu.-Kash., Mong., Tib., Jap.-Ch. Described from a locality between the Ural and Samara rivers. Type in London.

Economic importance. A common weed of Siberia. In southern regions used as winter feed for camels; before fruiting suitable for silage (I. Larin).

5. *S. monoptera* Bge. in Bull. l'Acad. d. Sc. d. St. Pétersb. XXV (1879) 364. — *Monopterygium minutiflorum* Bge., l. c., p. 365.

216 Annual, 5—40 cm high, branching from the base; branches long, approximate at base, secondarily patulous-branched, mostly reddish; stem and branches densely leafy, hirtellous; leaves alternate, long, thin, subfiliform, spinescent, somewhat dilated and narrowly scarious-margined at base, spreading, not wilting at fruiting; flowers small, solitary, concealed in the axils of long bracts and laterally subtended by bracteoles; these many times the length of the flower; perianth glabrous, scarious, developing in fruit one little wing on the abaxial side and rarely an additional narrower and even more reduced one on the adaxial side; other segments of fruiting perianth wingless or merely with rudiments of wings; fruiting perianth including wings to 1—1.75 mm in diameter, the lobes above the wings soft, scarious, crumpled; stigmas filiform, on a very short style; seed horizontal or very slightly oblique, 0.75—1 mm in diameter, strongly convex ventrally. July—August. (Plate XI, Figure 5).

Sandy places, stony clayey slopes, desert-steppe plant communities, and old resting places for livestock. — W. Siberia: Alt. (Chuya Steppe). Gen. distr.: Mong., Tib. Described from SE Mongolia. Type in Leningrad.

6. *S. praecox* Litw. in Sched. ad Herb. Fl. Ross. IV (1902) 66. — *S. kali* var. *praecox* Litw., l. c., p. 65. — *S. kali* var. β Pall. Illustr. (1803) 37. — *S. kali* γ nodiflora Fenzl in Ldb. Fl. Ross. III, 2 (1851) 799. — *S. elegantissima* Iljin in Mat. Komiss. eksp. issl. Akad. Nauk SSSR 26 (1930) 282. — Ic.: Iljin, l. c., fig. 3 (sub *S. elegantissima*). — Exs.: HFR no. 1131; Sintenis It. trans-casp.-pers. no. 333b.

Annual, 5—25 cm high, bushy-branched from the base, very rarely the stems unbranched or very sparingly branched (f. *elegantissima* Iljin), glabrous (f. *glabra* Iljin) or densely hirtellous (f. *hirtula* Iljin); leaves alternate, filiform, stiffish, almost semiterete, very slightly and gradually dilated toward base, spreading almost horizontally, spiny-tipped, usually somewhat reflexed in upper part, persistent and not wilting at fruiting; bracts longer than bracteoles, often thickened at base; flowers solitary in spiciform inflorescences; perianth glabrous or rough; segments of fruiting perianth winged below the middle, together with wings 6—8 (rarely 9) mm in diameter; wings hyaline, colorless, markedly nerved, overlapping, 3 of them subreniform, the other 2 very narrow; segments above the wings long-acuminate from a very broad base, rising into a long central beak; stigmas filiform, as much as to 2—4 times as long as style; seed horizontal. April—June; fr. May—July.

Steppes with sandy soil and sandhills. — European part: L. V.; Caucasus: Tal. (between the villages of Alekseevka and Gamushavan); Centr. Asia: Ar.-Casp. (S.), Balkh., Kyz. K., Kara K., Amu D. Endemic. Described from the Repetek area. Type in Leningrad.

7. *S. paulseni* Litw. in Izv. Turkest. Otd. Russk. Geogr. Obshch. IV, 5 (1905) 28. — Ic.: Litw.: l. c., p. 28. — Exs.: HFR no. 1431.

217 Annual, 10—40 cm high, densely hirtellous or papillous, very rarely glabrous (f. *glabra* Iljin), branching from the base, the few elongated lower

branches ascending; stem and branches roseate or purple, dark green when young and then turning black on drying; leaves alternate, thickish, semiterete, spinescent, all persistent, spreading, soon yellowing, the plant thus apparently tricolor (stems purple, leaves yellow, the young ones green); flowers with spreading spinescent bracteoles; perianth segments winged in fruit below the middle; wings thinly membranous, colorless or yellowish, pellucid, overlapping, 3 of them very broad; fruiting perianth including wings 5—8 mm in diameter; lobes of fruiting perianth above the wings slenderly long-acuminate, stiffish, forming a slender beak; stigmas filiform, as long as or longer than style; seed horizontal. July—September.

Solonetz sands, sandy-clay areas, more rarely blown sands and sandhills. — European part: L. V. (S.); Caucasus: Dag., E. Transc.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Amu D., Syr D. Endemic. Described from the vicinity of Farab railroad station on the Amu Darya River. Type in Leningrad.

Note. In all probability this species is merely an ecological form of the following, i. e., *S. pellucida*, but this question requires careful study.

Economic importance. According to I. A. Linchevskii, considered a good forage plant, apparently for camels.

8. *S. pellucida* Litw. in Sched. ad Herb. Fl. Ross. VIII (1922) 16. — Exs.: HFR no. 2434.

Annual, 15—60 cm high, strongly branching from the base, densely very minutely and often obscurely hirtellous; lower branches rather long, spreading; leaves alternate, filiform, almost semiterete, spiny-tipped, spreading; bracts broader, mostly longer than the spreading spinescent fruiting bracteoles; flowers in a spiciform inflorescence; perianth segments smooth or scabrous, long-acuminate, winged in fruit below the middle; wings thinly hyaline, colorless, prominently nerved, overlapping (3 of them broader, the 2 others sublinear); perianth including wings 7 (rarely 6)-12 mm in diameter; lobes of fruiting perianth long-acuminate, somewhat stiffish, connivent into a long slender beak; stigmas as long as to 2—3 times as long as style; seed horizontal. Fl. June—August; fr. August—September. (Plate XI, Figure 6).

218 Hummocky and ridged sands; more rarely at the foot of barchan dunes, and among steppe plant communities on sandy soil. — European part: L. V.; Caucasus: Dag., E. Transc. (Shirvan); Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Amu D., Syr D. Gen. distr.: Dzu.-Kash. Described from the vicinity of Farab railroad station on the Amu Darya River. Type in Leningrad.

Economic importance. A forage plant, according to I. A. Linchevskii. Analysis of Badkhyz specimens collected in mid-August gave the following percentage composition on a dry weight basis: moisture content 8.89, ash 18.64, fat 1.41, cellulose 17.27, nitrogen 1.51, albumin 9.46, nitrogen-free extract 54.22.

9. *S. tamamschjanæ* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, III (1936).

Annual, 20—50 cm high, profusely branched from the base, with rather long lower branches, completely procumbent or broadly spherical in outline; upper branches shorter, somewhat recurved, borne all the way up; the

sparingly white-striped stem and branches pale green and glabrous; leaves filiform-linear, keeled beneath, slightly channeled above, stiffish, glabrous, scarcely dilated at base, spiny-tipped, declinate; bracts somewhat broader at base, slightly longer than and shortly spinescent like the bracteoles, these ovate, keeled in lower part; flowers rather regularly distributed along the stem and branches from the base; perianth segments lanceolate, acuminate, whitish-scarious at tips, winged in fruit; wings subpellucid, soft, prominently nerved, 2 or 3 of them larger, reniform to broadly obovate, the others reduced to narrow obsolescent protuberances or linear and shorter; perianth including wings 15–18 mm, rarely less than 12 mm, in diameter; lobes of fruiting perianth attenuate-acuminate, soft, caducous; anthers unappendaged, free in lower one-third; stigmas densely villulose, 2.5–3 times as long as style; seeds horizontal, ca. 2.5–3 mm in diameter. Fr. September–October.

In *Achillea* semidesert, on sandy loam; in groups. — Caucasus: E. Transc. (Echmiadzin, Zvartnots). Endemic. Described from the vicinity of a ruined temple in Zvartnots. Type in Leningrad.

10. *S. tamariscina* Pall. It. III (1776) 604; Illustr. (1803) 33; Fenzl in Ldb. Fl. Ross. III, 801; Kryl., Fl. Zap. Sib. IV, 951; Shmal'g., Fl. II, 380; Il'in in Fl. Yugo-Vost. IV, 216. — *S. tenuifolia* Falk Beitr. II (1786) 141. — *S. tamariscifolia* Falk, l. c. — *Caroxylon tamariscinum* Moq. in DC. Prodr. XIII, 2 (1849) 174. — Ic.: Pall. Illustr. t. 25; Gmel. Fl. sib. III, t. XVII, fig. 1. — Exs.: HFR no. 1985 a and b.

219 Annual, 10–50 cm high; stem erect, simple or more often branching, naked, glaucous, sometimes scabrous, the branches upright; leaves alternate, linear, 5–15 mm long, stiffish, dilated at base, mucronate; bracts about equaling or more often exceeding the triangular-ovate, broadly membranous, mucronate bracteoles; flowers axillary, mostly 1–3 (5) together, in spiciform inflorescence; perianth segments oblong-ovate, connate only at the very base, winged in fruit; wings semiorbicular, yellowish with darker or roseate nerves; lobes of fruiting perianth connivent, roseate; anthers unappendaged; stigmas 2–3 times as long as style; seed horizontal, ca. 1.5 mm in diameter. July–September.

Solonetztes, solonetzic steppes, and chalky outcrops; scattered, often over considerable areas. — European part: Transv. (S.), Bl. (E.), Crim., L. Don, L. V.; Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: U. Tob. (S.), Irt. (S.); Centr. Asia: Ar.-Casp., Balkh., T. Sh. (E.), Syr D. (Samarkand). Gen. distr.: Dzu.-Kash., Mong. Described from the vicinity of the Eruslan River. Type in London.

Economic importance. Goebel reports an analysis for old Astrakhan specimens, with ash amounting to 9.3 per cent of air-dry weight, of which 45 per cent water-soluble salts with the following composition: K_2SO_4 7.4806 g, KCl 0.1791, NaCl 25.4580, Na_2CO_3 8.1162, free sodium bicarbonate 1.4806; he computed the following figures: SO_3 3.4372, CO_2 3.3621, Cl 15.5421, K 4.1568, Na 19.801.

11. *S. rosacea* L. Sp. pl. (1753) 323; Fenzl in Ldb. Fl. Ross. III, 801; Kryl., Fl. Zap. Sib. IV, 952. — *S. meyeri* Litw. in herb. Acad. Sc. — *S. talassica* Drob. in herb. Bot. Inst. Univ. As. Med.

Annual, 10–40 cm high, glabrous, glaucous, mostly branching, the branches obliquely or sometimes subhorizontally spreading; leaves alternate, spreading, stiffish, linear, semiterete, mostly 10–30 mm long, scarcely dilated at base, obsoletely apiculate, decurrent as a narrow ridge; bracts commonly arched-upcurved, surpassing the bracteoles, these mostly as long as to 1.5–2 times as long as the perianth, ovate-lanceolate, mucronate, keeled, scarious-margined; flowers solitary in spiciform inflorescences; perianth segments oblong-ovate, glabrous, scarious-margined, winged in fruit; wings scarious, semipellucid, roseate or more rarely yellow with rosy nerves at base, spreading, reniform to obovate; perianth including wings 5–10 mm in diameter; lobes of fruiting perianth closely appressed to the fruit; anthers unappendaged; stigmas long, slender, shortly papillose, 2–3 times as long as style; seed horizontal. July–August. (Plate XIII, Figure 4).

Solonetzes. — W. Siberia: Alt.; Centr. Asia: Ar.-Casp. (Mugodzhary Hills), Balkh., Dzu.-Tarb. Gen. distr.: Dzu.-Kash., Mong. Described from N. Asia. Type in London.

220

Series 2. *Sodae* Iljin (= section *Soda* Dumort. Fl. Belg. (1827) 23 = *Soda* Fourr. Ann. Soc. Linn. Lyon. N. S. XVII, 1869, 145). — Anthers unappendaged or obsoletely appendiculate, the locules united in upper part; seeds horizontal or vertical; fruit beaker-shaped or cup-shaped; wings obsolescent.

12. *S. soda* L. Sp. pl. (1753) 223; Fenzl in Ldb. Fl. Ross. III, 803; Shmal'g., Fl. II, 380; Kryl., Fl. Zap. Sib. IV, 951; Il'in in Fl. Yugo-Vost. IV, 212. — *S. soda* var. *typica* Trautv. in Bull. Mosc. XL (1867) 66. — Ic.: Rchb. Ic. Fl. Germ. XXIV, t. 294; Pall. Illustr., t. 30; Fl. Yugo-Vost. IV, fig. 283, f. B. — Exs.: HFR no. 2425, 2426, 2427.

Annual, 10–80 cm high, glabrous, mostly pale green; stems simple or more often divaricately branching from base; lower leaves opposite, the upper alternate, linear-semiterete, fleshy, 3–8 cm long, dilated at base, aristate; bracts abbreviated, much longer than the bracteoles, these narrowly membranous, surpassing the flower; flowers mostly solitary, scattered in a spiciform inflorescence; segments of the broadly cup-shaped fruiting perianth membranous, ovate or oval, crenate at summit, indurated, with wing rudiments represented by transverse tubercles or triangular appendages; anthers essentially unappendaged; stigmas 2–3 times as long as style; seeds mostly horizontal or suboblique, 3–4 mm in diameter. July–September.

Solonchaks, saline meadows, and limans; in groups. — European part: Transv. (Orenburg), Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., S. and E. Transc.; W. Siberia: U. Tob. (SW), Irt. (S.); Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Centr. Eur., Med., Bal.-As. Min. Described from S. Europe. Type in London.

Economic importance. Considered good fall and winter forage for camels (I. Larin). Young plants are sometimes used in W. Europe as salad (Rosenthal). The plant provides a source of home-produced soda.

13. *S. mutica* C. A. M. in Bull. Soc. Nat. Mat. Mosc. II (1853) 455 et (1858) 62; Il'in in Fl. Yugo-Vost. IV, 213; Sched. ad HFR VIII 13. — *S. soda* var. *mutica* Trautv. in Bull. Soc. Nat. XL (1867) 66. — Ic.: Fl. Yugo-Vost. IV, pl. 283, fig. A. — Exs.: HFR no. 2428, 2429, 2430.

21

Annual, 10–50 cm high, glabrous, glaucous, mostly blackening in drying, branching from base; lower leaves opposite, the upper alternate, linear, 1–2 (3) cm long, semiterete, fleshy, obtuse; bracts abbreviated, strongly enlarged at base, longer than bracteoles, with mostly 3 flowers in their axils; segments of fruiting perianth ovate, minutely crenulate at summit, with obsolescent thickish and reddish wings, the entire perianth apparently stellate as seen from above; anthers obsoletely appendaged; stigmas 1.5–2.5 times as long as style; seed mostly vertical or oblique, 2–2.5 mm in diameter. August–September.

Solonchaks, saline meadows, and limans. — European part: Bl. (?), L. Don, L. V.; W. Siberia: U. Tob. (S.), Irt. (S.); Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from the vicinity of Krasnoarmeisk (formerly Sarepta). Type in Leningrad.

Economic importance. Considered good fall and winter forage for camels.

14. *S. komarovii* Iljin in Journ. Bot. de l'URSS XVIII, 2 (1933) 276. — *S. soda* F. Schmidt (non L.) Sachal. in Mém. Acad. St. Pétersb. sér. VII, v. XII (1868) 167; Kom., Fl. Manchzh. II, 163; Kom. and Alis., Opr. rast. Dal'nevost. kr. I, 480. — Ic.: Kom. and Alis., l. c., t. 146 (sub *S. collina*).

Annual, 10–40 cm high, yellowish-green, rarely darkish green, glabrous in all parts, branching from the base; leaves alternate, narrowly linear, semiterete, the lowermost almost flat, very slightly dilated at base and decurrent in linear stripes, mucronate, horizontally spreading; bracts strongly enlarged in lower part, longer than bracteoles, these broad, abruptly attenuate at apex, keeled; bracts and bracteoles accrescent in fruit in a conical yellowish structure tightly enveloping the fruit; flowers solitary; perianth subular; fruiting perianth cup-shaped, 2–5 mm in diameter, truncate at summit by abrupt incurving of the upper part of the oppressed segments, the margin of the curvature mostly with a narrow crestlike protuberance or more rarely with somewhat indurated darker obsolescent wings; anthers unappendaged; stigmas filiform, naked, faintly purplish on the inside, several times as long as the style; seed horizontal. August–September. (Plate XIII, Figure 8 a–b).

Sandy and sand-and-pebble seashores. — Far East: Uda, Uss., Sakh. Gen. distr.: Jap.-Ch. Described from the vicinity of Ryazanovka in the [former] South Ussuri Territory. Type in Leningrad.

Series 3. *Sogdianae* Iljin. — Locules of anthers free to the summit, surmounted by a firm sessile ovate appendage; seed horizontal.

15. *S. sogdiana* Bge. Reliq. Lehm. (1851) 297. — *S. paradoxa* Bge. in herb. Bot. Inst. Ac. Sc. USSR. — Ic.: Paulsen in Olufsen Sec. Pamir Exp. (1903) pl. III, a.

Annual, 10–50 cm high, glabrous, bushy-branched from the base; branches initially rufescent, becoming whitish; leaves alternate, linear-

filiform, semiterete, the lower and middle 20–80 mm long and mostly 1–2 mm broad, the lowermost often broader, dull pale green, more rarely linear, horizontally spreading and somewhat arched-upcurved, prickly-pointed, slightly enlarged at base, the lowermost 1–3 pairs soon wilting, broader, parallel-veined; flowers solitary in spiciform inflorescences; perianth segments lanceolate, acuminate, scarious and glabrous, in fruit broader, marcescent and winged; three of the wings broader, semicircular or reniform, the other two narrower, all pale and pellucid, clearly nerved; fruiting perianth including wings 12–15 mm in diameter; the scarious tips abruptly reflexed at center in 5-rayed stellate arrangement with a small central orifice, often caducous; anthers unappendaged, deeply separated right up to the thickish oval yellow connective; stigmas long, filiform, almost naked, 2–3 times as long as style; seed horizontal. May–June. (Plate XII, Figure 6).

Sandhills. — Centr. Asia: Ar.-Casp. (S.), Kyz K., Kara K. Gen. distr.: Iran. Described from the S. Kyzyl-Kum Desert. Type in Paris; cotype in Leningrad.

16. *S. aperta* Pauls. in Vidensk. Meddel. fra d. naturh. Foren. in Kbhvn. (1903) 197. — *S. sogdiana* Litw. (non Bge.) in Sched. ad Herb. Fl. Ross. IV (1902) 83. — Ic.: Pauls., l. c., pl. III b. — Exs.: HFR no. 1182.

Annual, 10–30 cm high, glabrous, divaricately and widely much branched from the base, more rarely narrowly pyramidal (var. *stricta* Iljin), the stem and branches at first rufescent, becoming whitish; leaves alternate, linear, pale green, dull, sessile, amplexicaul, prickly-pointed, the lower and middle on stem and main branches 15–60 mm long and 2–10 mm broad, flat or canaliculately folded, horizontally spreading or drooping, sometimes slightly upcurved; bracts on reduced branchlets short, oblong-linear to lanceolate or oblong-ovate, commonly somewhat reflexed, rarely erected, longer than the broader bracteoles; flowers solitary; perianth segments glabrous, lanceolate, membranous, acuminate, in fruit indurated in lower part and winged; wings scarious, almost pellucid, pale, prominently nerved, overlapping, two or three of them broader, reniform to broadly obovate, the others narrow; fruiting perianth including wings 5–10 mm in diameter; lobes above the wings scarious, strongly reflexed from base and stellately appressed, leaving the whole fruit exposed; anthers unappendaged, deeply separated to the thickish oval connective; stigmas slender, filiform, scarcely pustulose on the inside only, 2–3 times as long as style. Seed horizontal. May–July. (Plate XII, Figure 3).

123 Solonchak sands, Haloxylon aphyllum associations, loamy saline soils. — Centr. Asia: Balkh., Kyz. K., Kara K., Amu D. Endemic. Described from Kyz-Kal between Ishak-rabat village and Chardzhov. Type in Copenhagen.

17. *S. androssovii* Litw. in Sched. ad Herb. Fl. Ross. VI (1908) 111. — Exs.: HFR no. 1890.

Annual, 30–100 cm high, with very distinctive columnar habit due to the numerous dense reduced branchlets of about equal length distributed all along the stem; stems whitish, densely covered with very short papillose hairs; leaves numerous, closely approximate, alternate, sessile, linear,

scarcely dilated at base, semiterete, fleshy, 5—10 mm long, the lower ones to 20 mm, terminating in a bristle to 3 mm long, roughened with hairs like those of the stems; flowers solitary in the axils of all leaves; bracteoles broad, concave, narrowly scarious-margined, deflexed; mostly somewhat shorter than bracts; segments of fruiting perianth broad-ovate, scabrous, their slender scarious tips clustered at the summit of the fruit; wings above the middle of the perianth, pale, scarious, rather small, three of them relatively larger, reniform; anthers separated right up to the firm ovate and slightly recurved appendage; stigmas 2—3 times as long as style, together with it ca. 2.5 mm long; seed horizontal. August.

Clayey-solonchak, solonetzic-pebbly, and solonetzic-sandy soils. — Centr. Asia: Amu D. Endemic. Described from the vicinity of Kuyu-Mazar railroad station. Type in Leningrad.

18. *S. deserticola* Iljin in Journ. Bôt. de l'USSR XVIII, 4 (1933) 227.

Annual, 5—25 cm high, divaricately branching from the base, broadly hemispherically bushy, light gray, densely beset with very short papillae; stems whitish below; leaves numerous, alternate, closely approximate, sessile, thick, semiterete, ca. 4—6 mm long (the floral smaller), spreading, terminating in a prickle 3—5 mm long; lower cauline leaves to 15—20 mm long, soon wilting and deciduous; bracts and bracteoles also spinescent. Flowers numerous, almost from the base of the stem; fruiting perianth with but 3 thin colorless hyaline semiorbicular or subrotund or round wings, sometimes wingless, the perianth including wings 2—6 mm in diameter; segments above the wings stiffish, convex, covering the fruit, in apical portion thin, scarious, soft, forming a loose central beak, sometimes divergent; anthers with locules free except at summit where connected by the rather small firm semioval sessile appendage which merges imperceptibly with the locules; stigmas long, filiform, many times the length of the obsolescent style; seed horizontal.

Clayey soils. — Centr. Asia: Kyz. K. (SW). Endemic. Described from Sultan-uiz-dag in the Amu Darya River delta. Type in Leningrad.

Section 2. *PHYSURUS* Iljin. — *Eusalsola* Fenzl in Ldb. Fl. Ross. III, 2, (1851) 804, partim. — Section *Nitraria* Ulbrich in Engl. u. Prantl. Pflanzenf. 16c (1934) 564 (p. p.). — Leaves decurrent; appendages of anthers bladdery, borne on a very short stipe; seeds horizontal.

Series 1. *Lanatae* Iljin. — Stigmas very short; style 2 to many times as long as stigmas; anthers roseate or white. Annual plants with obtuse leaves.

19. *S. lanata* Pall. It. II (1773) app. 736; Illustr., 29; Fenzl in Ldb. Fl. Ross. III, 805; Il'in in Fl. Yugo-Vost. IV, 218; Shmal'g., Fl. II, 381 (p. p.). — Ic.: Pall. Illustr. t. 21; Fl. Yugo-Vost. IV, fig. 285. — Exs.: HFR no. 2585.

Annual, 10—60 cm high, erect, glaucous, branching from base, covered with long spreading subsequently falling hairs and a dense lining of short

hairs; leaves alternate except the lowermost, fleshy, semiterete, very slightly decurrent at base, obtuse; bracts somewhat shorter than to equaling the bracteoles, these attaining the length of perianth; flowers solitary in a spiciform inflorescence; perianth segments lanceolate, acuminate, hairy, winged in fruit below the middle; wings relatively large or [?] reniform, red, overlapping, the perianth including wings 10—17 mm in diameter; anthers with bladdery roseate short-stipitate appendage; stigmas thick, included or scarcely exerted; style many times as long as stigmas. July—September. (Plate XI, Figure 8).

Solonchaks and solonetz soils with solonchak characteristics. Growing in groups. — European part: L. V. (very rare); Centr. Asia: Ar.-Casp., Balkh., T. Sh. (rare), Kyz. K., Kara K., Amu D., Pam.-Al. (rare), Mtn. Turkm. Gen. distr.: Iran., Dzu.-Kash. Described from the vicinity of Saraichik* on the Ural River. Type in Leningrad.

225 Economic importance. Goebel reports the following analysis of results for young plants from the Lower Volga region (it may be assumed that they actually refer to another species, namely *S. crassa* M. B.): ash 19% of air-dry weight, of this 38% soluble salts composed of K_2SO_4 6.5473 g, KCl 8.9219, NaCl 11.2547, Na_2CO_3 4.1932, free sodium bicarbonate 4.0913; the acids consisting of SO_3 3.0075 g, CO_3 1.7370, Cl 10.9164; the bases of K 9.3044 g, Na 12.5450. According to Agababyan, Granitov, and Kasimenko, the plant is eaten in fall and winter by sheep and camels. Analysis of plants from the Talas-Susamyr District of the Kirghiz ASSR gave the following percentage composition for plants gathered at the beginning and end of September, respectively: hygroscopic water 5.28 and 4.89, ash 39.30 and 40.64, cellulose 17.00 and 12.60, crude protein 6.67 and 10.13, crude fat 1.18 and 2.84, nitrogen-free extract 31.17 and 25.30.

20. *S. longistylosa* Iljin in Bull. Jard. Bot. de l'Acad. de Sc. de l'URSS, XXX, 5—6 (1932) 747.

Annual, 15—50 cm high, glaucous, very hairy, with long spreading hairs tangled only at first and often disappearing at fruiting, and always with a persistent lining of short hairs; stems branching from base; leaves alternate except the lowermost, semiterete, very slightly decurrent at base, obtuse; flowers solitary in spiciform inflorescences; perianth hairy, winged in fruit; three of the wings relatively large, semiorbicular or reniform, the other two narrower, oblong, or merely rudimentary; anthers surmounted by a large bladdery globose or oblong-globular roseate appendage; stigmas 0.3—1 mm long; the much exerted style many times longer, attaining 7—9 mm in length; seed 2.5—3 mm in diameter. July—September. (Plate XII, Figure 9).

Solonchaks. — Centr. Asia: Kara K. (E.), Amu D., Syr D. (Golodnaya Steppe). Endemic. Described from the Golodnaya Steppe in the Samarkand District. Type in Leningrad.

21. *S. kasakorum* Iljin in Acta Inst. Bot. Ac. Sc. USSR, ser. 1, fasc. II (1936) 126.

Annual, 15—50 cm high, divaricately branching from base, intensely glaucous, covered in lower part with long spreading tangled hairs, in upper part sparsely or very sparsely covered with spreading bristles or quite

* [About 50 km north of present-day Gur'ev.]

glabrous; leaves alternate, fleshy, obtuse, decurrent, spreading; bracteoles slightly shorter than perianth; flowers in rather loose spiciform inflorescences; perianth segments glabrous, scarious at apex, winged in fruit; wings rosy-purple (always?), overlapping, two of them narrower than the others; fruiting perianth including wings ca. 12 mm in diameter, the lobes connivent into a long cone; anthers divergent to one-third their length, surmounted by bladdery ovaloid-globular appendages borne on a very short stipe; style many times longer than very short stigmas; seed horizontal. June—August.

Argillaceous and puffy solonchaks. — Centr. Asia: Ar.-Casp. (E.), Balkh. (W.). Endemic. Described from the vicinity of Saksaul'skaya station, from Termenbes in the Irgiz District. Type in Leningrad.

22. *S. bucharica* Iljin in Acta Inst. Bot. Ac. Sc. USSR, ser. 1, fasc. II (1936) 126.

26

Annual, 15—40 cm high, whitish-glaucous, branching, covered with spreading hairs, finally glabrous or nearly so in upper part, in lower part with fugacious long tangled hairs; leaves alternate, terete, obtuse, decurrent; bracteoles ovate, about as long as or very slightly shorter than bracts and perianth; flowers in spiciform inflorescences; perianth segments acuminate, hairy, scarious at apex, winged in fruit; wings purple, mostly semiorbicular, overlapping, some much narrower than others; fruiting perianth including wings 10—12 mm in diameter, the lobes rising in a long slender cone; anthers surmounted by bladdery appendages borne on a very short stipe; stigmas subulate; 3 (rarely 2) to 4 times as long as stigmas; seed horizontal.

Solonchak "tugai" and puffy solonchaks. — Centr. Asia: Amu D., Pam.-Al. (Amu Darya River valley). Endemic. Described from the Amu Darya River valley, from Gatach between Aivaduk village and Ovrazhnyi. Type in Leningrad.

Series 2. *Crassae* Iljin. — Stigmas equaling or many times or rarely two-thirds as long as style. Annual plants; leaves obtuse.

23. *S. crassa* M. B. in Mém. Soc. Nat. Mosc. I (1806) 100; Fenzl in Ldb. Fl. Ross. III, 804 (p. p.); Shmal'g., Fl. II, 381; Il'in in Fl. Yugo-Vost. IV, 217. — (?) *S. frutescens* Pall. It. I (1771) 431. — ? *S. fruticosa* Pall. It. III (1776) 604. — *S. rosacea* M. B. Besch. d. Länd. zw. Ter. u. Kur. app. (1800) 143; Pall. Illustr. (1803) 26. — Ic.: Pall. Illustr. XVIII. — Exs.: HFR no. 2439; Pl. or. exs., no. 360.

Annual, 5—50 cm high, bushy-branched from base with opposite approximate lower branches, at first covered mostly in lower part with long tangled hairs, often almost tomentose, at fruiting the upper part glabrous, the lower with persistent tomentum of long hairs (*fl. lanifera* Iljin) or more often glabrate; leaves alternate, fleshy, semiterete, obtuse, spreading, decurrent; bracts shorter, slightly surpassing the bracteoles, these broad-ovate, attenuate at apex, equaling or scarcely shorter than the perianth; flowers in a spiciform inflorescence; perianth segments lanceolate, acuminate, glabrous, winged in fruit at or very slightly below

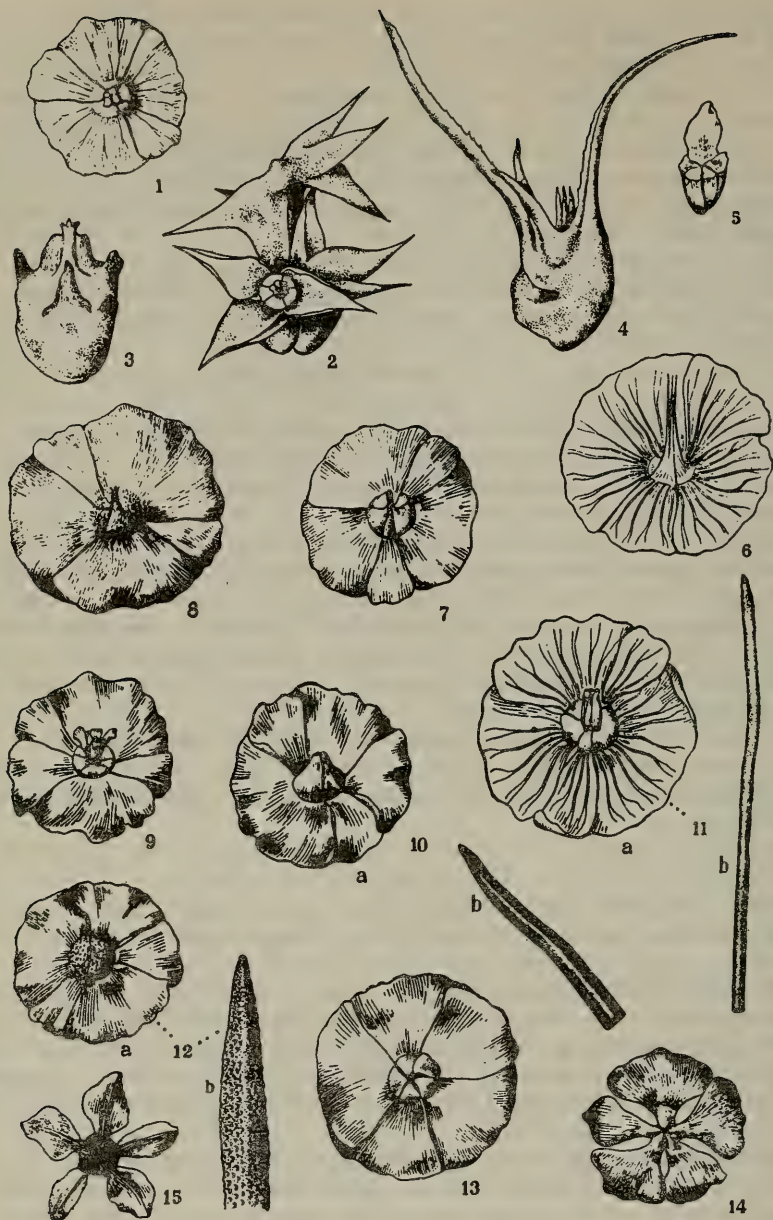


PLATE XI. Fruiting perianth of: 1. *Salsola ruthenica* Iljin.— 2. *S. stragus* L.— 3 and 4. *S. collina* Pall.— 5. *S. monoptera* Bge.— 6. *S. pellucida* Litw.— 7. *S. crassa* M.B.— 8. *S. lanata* Pall.— 9. *S. arbuscula* Pall.— 10. *S. arbusculaeformis* Drob.: a) perianth, b) leaf.— 11. *S. richteri* Kar.: a) perianth, b) leaf.— 12. *S. transhyrcanica* Iljin: a) perianth, b) leaf.— 13. *S. subaphylla* C.A.M.— 14. *S. sclerantha* C.A.M.— 15. *S. carinata* C.A.M.

29 the middle; wings large, semiorbicular, overlapping, roseate or purple or yellowish, two of them very narrow and often sublinear; fruiting perianth including wings 12—18 mm in diameter; the lobes vaulted at the broad base, their scarious tips connivent into a rather short beak; anthers free in lower one-third, terminating in a bladdery white or faintly roseate appendage; borne on a very short stipe; stigmas subulate, as long as to 1.5 times as long as style; seeds horizontal or oblique. July—September. (Plate XI, Figure 7).

Solonchaks and crustose or lumpy solonetztes; in sometimes large groups. — European part: L. V.; Caucasus: Cisc., Dag., E. Transc.; Centr. Asia: Ar.-Casp. (W.). Gen. distr.: Arm.-Kurd. Described by Bieberstein from the Kura River area. Type in Leningrad.

Note. All forms earlier described for this species belong to other species of the cycle *S. crassa*, l. c., and will be reviewed below.

Economic importance. Used for domestic production of soda. A fall and winter forage for camels. Analysis of fruiting plants from W. Kazakhstan (Gur'ev area) gave the following results for air-dry herbage: hygroscopic water 6.86, ash 27.82—29.87, cellulose 10.47—11.24, crude protein 6.11—6.56, crude fat 2.10—2.25, nitrogen-free extract 46.46—50.08; starch equivalent 32.29—34.69. Upon soaking, these plants yielded the following results: hygroscopic water 4.86, ash 12.09—12.71, cellulose 15.08—15.83, crude protein 5.89—6.19, crude fat 2.50—2.63, nitrogen-free extract 59.58—62.62; starch equivalent 40.38—42.34 (I. Larin). The ash of this plant is sometimes used for dyeing wool. According to Agababyan, Granitov, and Kasimenko, the fruits of the plant (in the broad sense comprising the entire cycle) are of great importance as fattening feed for sheep and may be used as a partial substitute for concentrates, hence they are known by local shepherds as "ovechii yachmen'" (sheep barley). The plant is recommended for horticultural use as ornamental.

24. *S. subcrassa* M. Pop. in Addenda V, p. 663.

Annual, 15—40 cm high, branching from the base with rather long lower branches, covered in lower part with long tangled fugacious hairs, in upper part glabrate or with diffuse very short spreading hairs; leaves alternate, fleshy, obtuse, decurrent; bracteoles ovate; flowers in a spiciform inflorescence; perianth segments glabrous, winged in fruit about the middle; wings broad, overlapping, purple or roseate; fruiting perianth including wings 10—12 mm in diameter, the lobes forming a gently sloping dome, their short scarious tips appressed or divergent from the center; anthers free in lower one-third, terminating in a white rounded-oval bladdery appendage borne on a very short stipe; stigmas subulate-filiform, at least 3—4 times as long as style.

30 Centr. Asia: Balkh. (Zaisan). Gen. distr.: Dzu.-Kash. Described from the vicinity of Urumchi in Chinese Turkestan. Type in Leningrad.

25. *S. transoxana* Iljin in Acta Inst. Bot. Ac. Sc. ser. 1, II (1936) 127. — *S. obtusifolia* Litw. in Sched. ad Herb. Fl. Ross. II (1900) 41. — Exs.: HFR no. 334 (sub *S. obtusifolia*) no. 482 (sub *S. crassa* var. *glabra*).

Annual, 10—60 cm high, branching from base with spreading, rather long low branches, covered in lower part with long tangled often fugacious

hairs, in upper part glabrous or rarely with diffuse very short hairs; leaves alternate, fleshy, obtuse, decurrent; bracteoles ovate, attenuate at apex, mostly somewhat shorter than perianth; flowers in a spiciform inflorescence, approximate at the tips; perianth segments acuminate, short-hairy, winged in fruit slightly below the middle; wings scarious, semicircular, roseate or faintly yellowish, overlapping, two of them very narrow; fruiting perianth including wings 10—15 mm in diameter, the lobes stiffish and gently conical in lower part, smoky-scarious in upper part, loosely and often but temporarily connivent into a beak; anthers separated in lower one-half to two-fifths; appendage bladdery, borne on a very short stipe, rose or white, globular or ovaloid; stigmas subulate-filiform, subsessile or borne on a very short style not more than one-third the length of stigmas; seed horizontal. August—September.

Solonchaks. — Centr. Asia: Kara K., Amu D., Pam.-Al. (W.). Gen. distr.: Iran. ? Described from the vicinity of Ashkhabad. Type in Leningrad.

26. *S. korshinskyi* Drob. in Trav. Mus. Bot. Acad. Sc. Pétersb. XVI (1916) 142. — Ic.: Drob., l. c., t. XVI, f. 2. — Exs.: HFR no. 2783.

Annual, 20—75 cm high, erect, branching (not bushy); branches obliquely ascending, the lower often undeveloped; stem glaucescent, faintly purple, covered with short spreading hairs, in lower part with fugacious long tangled hairs, or rarely the whole plant covered with long hairs (var. *villosa* Iljin); leaves alternate, fleshy, obtuse, decurrent, spreading; bracteoles ovate, about as long as perianth; flowers in a rather compact spiciform inflorescence; perianth segments acuminate, puberulous, winged in fruit at the middle; wings thin, scarious, reniform or broad-obovate, overlapping, two of them often quite narrow; fruiting perianth including wings 10—12 mm in diameter, the scarious tips of the lobes rising in a short loose column; anthers divergent in lower one-third to one-half, with a whitish or faintly roseate bladdery appendage borne on a very short stipe; stigmas subulate, 1—1.5 times or but two-thirds as long as style; seeds mostly horizontal. July—September.

"Tugai," waterside chee-grass and other tall grass solonchak thickets, also puffy lacustrine solonchaks. — Centr. Asia: Balkh., Syr D., T. Sh. (E.). Gen. distr.: Dzu.-Kash. Described from Uzbekistan between Lake Dam-kul' and the Syr Darya River (first specimen), and from Sary-Kamysh Island near the village of Khodzha-Yagona (second specimen). Type in Leningrad.

27. *S. aralensis* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, II (1936) 127.

Annual, 30—75 cm high, erect, with obliquely ascending branches; stem glaucescent-purple, covered with rather short spreading often fugacious hairs entangled below; leaves alternate, fleshy, obtuse, decurrent, hairy; bracteoles as long as perianth; flowers in dense spiciform inflorescences; perianth segments glabrous, winged in fruit; wings scarious, roseate or yellowish, overlapping, 2 or 3 of them narrower than others; fruiting perianth including wings 10—14 mm across, the lobes with soft scarious tips connivent in a column or distinct; stamens with an oval-subulate

white or roseate bladdery appendage borne on a very short stipe; stigmas subulate-filiform, 1—1.5 times as long as the style; seed horizontal.

July—August.

"Tugai" and solonchaks. — Centr. Asia: Ar.-Casp., Kyz K. Endemic. Described from the Amu Darya River delta near the Kok-uzzyak irrigation channel. Type in Leningrad.

28. *S. intricata* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, II (1936) 128.

Annual, 15—45 cm high, divaricately branching from base, glaucous, covered in lower part with long spreading partly tangled often very dense, largely fugacious hairs, in upper part glabrate or merely with spreading hairs at the nodes; leaves alternate, very fleshy, obtuse, decurrent; bracteoles as long as or slightly shorter than perianth; flowers in loose spiciform inflorescences, subdistant in fruit; perianth segments glabrous, winged in fruit below the middle; wings broad, semiorbicular, roseate (always?), overlapping, 2 or 3 narrower than the others; fruiting perianth including wings 15—17 mm in diameter, the lobes forming a steep cone; anthers free to one-third, terminating in a bladdery globular to ovaloid-globular short-stipitate whitish or roseate appendage; stigmas subulate-filiform, 1—1.5 times as long as the style; seed horizontal. August.

Solonchaks. — Centr. Asia: Syr D. (Golodnaya Steppe). Endemic. Described from the Golodnaya Steppe, from the vicinity of Konnogvardeisk settlement. Type in Leningrad.

29. *S. lachnophylla* Iljin sp. nov. in Addenda V, p. 664.

Annual to 30 cm high, densely covered, especially in lower part, with soft somewhat tangled hairs forming a loose hairy coat, the hairs on the stem more spreading and without a lining; stem branching from base; branches equal, ascending, whitish, branched in turn; leaves obtuse, semiterete, 7—10 mm long and 1—1.5 mm in diameter, slightly decurrent, spreading, the lower with a dense cottonwool-like coating of hairs; bracts slightly longer than bracteoles; perianth segments acute, scarious, hairy on the back; anthers linear, 2—2.5 mm long, free in lower one-third, appendiculate, the globular bladdery appendages whitish-roseate, much broader than the anthers; stigmas sessile. September.

Solonchaks. — Centr. Asia: Syr D. Endemic. Described from the Dal'verzinskaya Steppe between Lakes Vneshnoe and Koshkul'. Type in Leningrad.

30. *S. minkvitziæ* Eug. Kor. in Sched. ad Herb. Fl. As. Med. III—V (1924) 34. — Exs.: H. F. A. M., fasc. III—V, no. 114.

Annual, 15—40 cm high, branching from base, slightly glaucescent yellow-green, in lower part with long tangled partly fugacious hairs, in upper part with very short spreading partly fugacious hairs; leaves alternate, spreading, obtuse, decurrent; bracts and bracteoles subacute, equaling or slightly shorter than the perianth; flowers in a spiciform inflorescence; perianth segments acuminate, short-hairy, subsequently somewhat glabrescent, winged in fruit below the middle; wings scarious, mostly lurid or very faintly roseate, semiorbicular, 2 or 3 shorter than the rest, overlapping; fruiting perianth including wings 10—12 mm in diameter,

the lobes forming a central beak, this not constricted as in *S. heptapotamica*; anthers often large, to 3–4 mm long, free below almost to the middle, terminating in a bladdery yellow globular-ovaloid short-stipitate appendage; stigmas subulate, 3–4 times as long as the style; seed horizontal.

Solonchaks. — Centr. Asia: Syr D. Endemic. Described from the Dzhizak District (Golodnaya Steppe), from the shores of Lake Tuzkan. Type in Tashkent; cotype in Leningrad.

31. *S. turgaica* Iljin in Acta Inst. Bot. Ac. Sc. URSS ser. 1, II (1936) 128.

233 Annual, 10–30 cm high, bushy-branched from the base, with rather long approximate and mostly ascending lower branches, conspicuously glaucous, covered in lower part with long tangled fugacious hairs, in upper part glabrous or more rarely with localized very short spreading hairs; leaves alternate, fleshy, obtuse, decurrent, spreading; bracteoles ovate, mostly very slightly shorter than perianth; flowers in a spiciform inflorescence; perianth segments acuminate, commonly glabrous, winged in fruit at the middle; wings semiorbicular, overlapping, roseate or yellowish (?), two of them very narrow; fruiting perianth including wings 8–13 mm in diameter, the lobes gently vaulted above the fruit, connivent above a constriction into a loose central beak not longer than the wings; anthers divergent in lower one-third to two-fifths, terminating in a yellow bladdery rather soft short-stipitate appendage; stigmas subulate, subsessile or more rarely style 3–4 times as long as stigma; seed horizontal. July–August.

Solonetztes and solonchaks with solonetz characteristics, mostly in the midst of large sandy stretches. — Centr. Asia: Ar.-Casp. Endemic. Described from the Malye Barsuki sands east of Kara-chokat, near the Ak-bulak spring. Type in Leningrad.

Note. A related species (*S. septentrionalis* Iljin in herb.) apparently occurs in Semipalatinsk Region. It differs from *S. turgaica* and *S. heptapotamica* Iljin in that its stigmas are but 1–1.5 times or two-thirds as long as style. Since the material relating to this species is very inadequate, we refrain for the time being from describing it together with other species of the cycle.

32. *S. heptapotamica* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, III (1936). — *S. obtusifolia* Iljin (non Litw.) in herb. Inst. Bot. Ac. Sc. URSS. — *Halimocnemis obtusifolia* C. A. M. (Schrenk) in Bull. Acad. Pétersb. 1 (1843) 79. — *Halogeton obtusifolius* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 834. — *Salsola* sp. Bge. in Anab. rev. (1862) 73.

Annual, 15–40 cm high, branching from base, yellowish-green, covered in lower part with long tangled fugacious hairs, in upper part glabrous; leaves alternate, fleshy, terete, decurrent, obtuse, at first covered with tangled hairs, becoming glabrous; bracts shorter than leaves, equaling or slightly surpassing the broadly lanceolate to oblong-ovate bracteoles, these very slightly shorter than perianth; flowers in a spiciform inflorescence; perianth segments lanceolate, acuminate, scarious, glabrous, winged in fruit below the middle; wings scarious, three of them reniform or semiorbicular, the two others narrowly spatulate or oblanceolate;

fruiting perianth including wings 10—12 mm in diameter, the lobes connivent at the center in a cone extending into a beak, this pale, constricted at the middle and scarious above the constriction; anthers divergent up to the middle, terminating in a bladdery ovoid or globular bright yellow appendage borne on a very short stipe and half as long as the anther; stigmas subulate, 2—3 times as long as style; seed horizontal. July—August.

Solonchaks and takyrs, mostly in sandy areas. — Centr. Asia: Balkh.

Gen. distr.: Dzu.-Kash. Described from the vicinity of Lake Alakul'.

Type in Leningrad.

Note. This species should actually be named *S. obtusifolia* Iljin, but this cannot be done since D. Litvinov, and subsequently various other authorities, have used this name for another species from Turkmenistan, erroneously considering C. A. Mayer's *Halimocnemis obtusifolia* as identical with the Transcaspiian species. Thus *S. obtusifolia* Litw. is not the same as *S. obtusifolia* Iljin.

33. *S. turcomanica* Litw. in Sched. ad. Herb. Fl. Ross. II (1900) 10. — *S. ferganica* Drob. in Trav. Mus. Bot. Ac. Sc. Pétersb. XVI (1916) 141. — *S. crassa* α *pubescenti-lanuginosa* C. A. M. (non Fenzl) in Eichw. Pl. casp.-cauc. (1831—33) 35. — *S. crassa* α *tomentosa* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 804. — Ic.: Eichw., l. c., t. XXV (sub *S. crassa*); Drob., l. c., t. XVI, f. 1 (sub *S. ferganica*). — Exs.: HFR no. 230.

Annual, 10—40 cm high, bushy-branched from base, with rather long approximate opposite lower branches, mostly glaucous, covered throughout with very short spreading hairs and an appressed tomentum of fairly short tangled hairs, often glabrescent when plant in fruit; leaves alternate, fleshy, obtuse, decurrent, spreading; bracts abbreviated; bracteoles about the length of perianth; flowers in a spiciform inflorescence; perianth segments long-acuminate, covered with short hairs, winged in fruit markedly below the middle; wings broad, semiorbicular, overlapping, two of them sublinear; fruiting perianth including wings 12—20 mm in diameter, the lobes rising from a broad base to a slender beak; anthers divergent in lower one-fourth to one-half, terminating in whitish bladdery short-stipitate appendage much shorter than anther; stigmas subulate, sessile or borne on a very short style and then at least 3 times its length; seeds mostly horizontal. July—September.

Solonchaks and salinas in areas with large stretches of sand, saline sands, and puffy solonchaks. — European part: L. V. (very rare. — N. shore of the Caspian Sea); Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Mtn. Turkm., Amu D., Syr D. Gen. distr.: Iran. Described from Dagada Island in the Caspian Sea under the name *S. crassa* α *pubescenti-lanuginosa*, while Litvinov's description of this plant as a new species refers to the surroundings of Ashkhabad. Type in Leningrad.

Economic importance. Readily eaten by all kinds of livestock throughout the year (Agababyan, Granitov, and Kasimenko).

Note. We believe that, even though this species was described earlier, the use of the combination *Salsola pubescenti-lanuginosa* Iljin or *S. tomentosa* Iljin is undesirable, since these forms have been applied in the literature most inappropriately and have led to much confusion. Fenzl already gives them a wrong interpretation and it is

therefore better to retain Litvinov's appellation, the more so since the name is perfectly regular.

Series 3. *Olgae* Iljin. — Leaves acute; undershrubs; stigmas longer than style.

34. *S. olgae* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, II (1936) 128.

Undershrub, 30—50 cm high, much branched; shoots covered in lower part with long tangled fugacious hairs, in upper part glabrous; leaves alternate, semiterete, fleshy, decurrent, subacute or rarely obtusish; bracts and bracteoles acute or acuminate; bracteoles oblong-ovate, scarious-margined, about as long as or slightly shorter than perianth; flowers in a spiciform inflorescence; perianth segments glabrous, acuminate, winged in fruit; wings suborbicular, purple (always ?), two or three of the segments narrow-winged; fruiting perianth including wings 10—12 mm in diameter, the lobes connivent in a cone constricted about the middle, stiffish below and scarious above the constriction; anthers distinct in lower one-fourth to one-third, terminating in bladdery appendage borne on a very short stipe; stigmas subulate-filiform, at least 3 times as long as style; seeds horizontal.

Central Asia: Syr D. (Namangan District). Endemic. Described from the vicinity of Sangistan village (Uzbekistan). Type in Leningrad.

Section 3. *BRACHYPHYLLA* Iljin. — *Eusalsola* Fenzl, l. c. (p. p.); Section *Nitraria* Ulbrich in Engl. u. Prantl. Pflanzenf. 16c. (1935) (p. p.). — Bracts and bracteoles shorter than perianth; appendages of anthers scarious; stigmas long, filiform.

35. *S. affinis* C. A. M. in Bull. Acad. Pétersb. I (1843) 350; Fenzl in Ldb. Fl. Ross. III, 805; Kryl., Fl. Zap. Sib. IV, 954. — *Petrosimonia korshinskyi* Litw. in Trav. Mus. Bot. Acad. Sc. Pétersb. VII (1910) 79. — *Halimocnemis malacophylla* Kar. et Kir. (non C. A. M.) in Bull. Soc. Nat. Mosc. XIV (1841) 732. — *H. kirilowii* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 844. — *Halogeton malacophyllus* Bge. Reliq. Lehm. (1851) 301 in observ. — *Gamanthus barbellatus* Bge. in A. H. P. VI, 2 (1880) 448. — Exs.: HFR no. 2440.

236 Annual, 5—40 cm high, branching from base, densely covered with short fugacious hairs; lowermost approximate opposite pairs of branches ascending and almost as long as the stem; leaves alternate except the lowermost, fleshy, semiterete, obtuse, linear, the lower subapproximate, spreading, slightly arched-incurved in lower part, somewhat reflexed above, the middle ones remote; bracts, especially the upper, ovate or even broader, commonly shorter than the orbicular obtusely keeled bracteoles; flowers in compact spiciform inflorescences, after anthesis surpassing the bracts and bracteoles; perianth segments scarious, acuminate, glabrous or with fugacious hairs, winged in fruit; wings reniform or obovate, bright purple turning brown; fruiting perianth including wings 4—8 mm across, the lobes closely connivent in a cone; anthers with linear-filiform filaments, divergent up to the middle,

terminating in an oval or oblong-ovate scarious flattish colorless mostly incurved appendage, this one-eighth to one-fourth as long as anther; stigmas long, filiform, pustulose on the inside, 1—1.5 times as long as style; seed horizontal, more rarely vertical. July—August.

A plant associated with gypsiferous solonchaks and occurring on white or mottled clays, gravelly desert slopes, and takyr; growing in groups. — Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Dzu.-Kash. Described from the Chu River valley. Type in Leningrad.

Section 4. *HETEROTRICHA* Iljin (= *Eusalsola* Fenzl in Ldb. Fl. Ross. III, 1851, 804, partim). — Section *Nitraria* Ulbrich in Engl. u. Prantl, Pflanzenf. 16c (1934) 564 (p. p.). — Leaves (except bracteal) opposite; appendages of anthers scarious, narrowing at base; stigmas sessile; seeds vertical.

36. *S. brachiata* Pall. Illustr. (1803) 30; Fenzl in Ldb. Fl. Ross. III, 806; Shmal'g., Fl. II, 382; Kryl., Fl. Zap. Sib. IV, 954; Il'in in Fl. Yugo-Vost. IV, 210. — *S. pallasiana* Vest. in Roem. et Schult. Syst. veg. VI (1820) 240. — *S. bracteata* Georgi Besch. d. Russ. R. Nachtr. XII (1802) 265. — *Halimocnemis brachiata* Rupr. in Mém. Acad. Pétersb. VII sér., XIV, 4 (1869) 71. — *H. tianschanica* Litw. in Trav. Mus. bot. Acad. Pétersb. VII (1910) 80. — *H. reznichenkoana* Litw., l. c., 79. — Ic.: Pall. Illustr. t. 22. — Exs.: HFR no. 435.

Annual, 10—30 cm high; stem erect, commonly sparingly branching from base; lowest branches approximate, opposite, in candelabra-like arrangement; indument mostly consisting of appressed hairs interspersed with long articulate spreading ones, more rarely of appressed hairs alone (var. *aequipila* Iljin, l. c.), or else plants quite glabrous (var. *glabra* Iljin, l. c.) or densely covered with long articulate spreading hairs (var. *hirsutissima* Iljin, l. c.); leaves opposite, linear, terete, fleshy, mucronate; bracts surpassing the bracteoles, these shorter than perianth; perianth segments dark narrowly lanceolate, hairy, winged in fruit; wings broad, bright purple or lemon-yellow or yellow with purple margins, turning brown; anthers with long narrow scarious spatulate appendage; stigmas sessile; seeds vertical. July—September.

Solonchaks, solonchaks, and gypsiferous clays; scattered, over considerable areas, sometimes in patches as dense pure stands. — European part: Crim., L. Don, L. V.; Caucasus: Cisc., Dag.; W. Siberia: U. Tob. (S.), Irt. (S.); Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Dzu.-Tarb. (rare); T. Sh. (rare), Pam.-Al. (Zeravshan), Syr D., Mtn. Turkm. Gen. distr.: Dzu.-Kash., Mong. Described from the Lower Volga region. Type in London.

Economic importance. This plant grows usually in large masses and provides good forage for camels, though only in fall and winter. Analyses of flowering plants from W. Kazakhstan plants (Gur'ev area) gave the following percentage composition: hygroscopic water 8.07; ash 21.27—23.19, cellulose 12.69—13.78, crude protein 11.32—12.31, crude fat 1.05—1.14, nitrogen-free extract 45.61—49.58; starch equivalent 32.64—35.51.

Fruiting specimens gave the following results: hygroscopic water 7.30, ash 20.04—21.61, cellulose 15.77—16.99, crude protein 9.56—10.31, crude fat 2.31—2.50, nitrogen-free extract 45.02—48.59; starch equivalent 32.65—34.72 (I. Larin). Analysis of plants from the Lower Volga region showed 33% ash, of this 66.5% water-soluble, consisting of K_2SO_4 88.690 g, Na_2SO_4 4.5256, $NaCl$ 14.8193, Na_2CO_3 26.2634, free sodium bicarbonate 5.0580. The results for all plants from the same location were: 18.7% ash, of this water-soluble 63.5% with the following contents: K_2SO_4 8.6622, Na_2SO_4 2.7154, $NaCl$ 19.4569, Na_2CO_3 24.0782, free sodium bicarbonate 3.7955 (Goebel). Plants from the Talas-Susamyr District of the Kirghiz ASSR gave the following percentage values for June and October specimens, respectively: hygroscopic water 6.62 and 7.98, ash 34.80 and 11.62, cellulose 11.35 and 20.15, crude protein 5.67 and 7.74, crude fat 2.82 and 2.71; nitrogen-free extract 38.79 and 49.80 (Abolin and Sovetkina).

Section 5. ANCHOPHYLLUM Iljin (Section *Arbuscula* Ulbrich in Engl. u. Prantl. Pflanzenf. 16c, 1934, 565, p. p.). — Shrubs or trees; leaves shortly dilated at base, with a constriction above the dilated part; anthers with rather small scarious appendages; stigmas thickish, subulate or obtuse; seeds horizontal.

Series 1. *Arbusculae* Iljin. — Shoots mostly milky-white; shoots and leaves glabrous or hirtellous; perianth not hairy.

238 37. *S. arbuscula* Pall. It. I, app. (1771) 488; Illustr. 25 (1803). — *S. arborescens* L. f. Suppl. (1781) 173; Fenzl in Ldb. Fl. Ross. III, 816 (p. p.); Kryl., Fl. Zap. Sib. IV, 956; Shmal'g., Fl. II, 382; Il'in in Fl. Yugo-Vost. IV, 223. — *S. arborescens* var. *rugosiuscula* Moq. in DC. Prodr. XIII, 2 (1849) 185 (p. p.). — Ic.: Pall. It. I, t. G, f. 1; Illustr., t. 17; Eichw. pl. cauc.-casp., t. XXX; Paulsen, The Sec. Pamir Exp. (1912) f. 38. — Exs.: HFR no. 2243.

Shrublet 20—100 cm high, divaricately much branched, with light gray longitudinally fissured bark; young branches milky-white and smooth like the leaves (var. *typica* Litw. in Sched. ad HFR, VIII (1922) 21 = *S. arbuscula* var. *laeviuscula* Fenzl in Ldb. Fl. Ross. III (1851) 317, p. p.), or young branches hirtellous (var. *hirta* Litw., l. c., 22); leaves alternate, narrowly linear, 5—35 mm long, thickish, pale green, constricted just above the base, obsoletely gibbous at the dilated white base, on elongated shoots commonly terminating in a short cartilaginous cusp, on reduced shoots shorter, clustered, muticous, all abscising at the constriction; bracts surpassing the bracteoles, these broad-ovate to semiorbicular, mucronate, broadly scarious-margined; flowers solitary; perianth segments membranous, obtuse, winged in fruit below the middle; wings semiorbicular or narrower, scarious, slightly yellowish with a faint rosy flush, often slightly hairy; fruiting perianth including wings 8—12 mm across; the lobes gradually dilated toward apex, near the wings closely adherent to the fruit, in upper part rosulately expanded and sometimes reflexed; anthers with an oblong-ovate or lanceolate appendage; stigmas subulate, enlarged below and flat, 2—4 times as long as or more rarely equaling the style. July—September. (Plate XI, Figure 9).

Desert plant communities on sands and solonetz soils, shallow hummocky sands, gravelly and chalky slopes, and more rarely on rocks; scattered over considerable areas. — European part: L. V.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Mtn. Turkm., Amu D., Syr D., Dzu.-Tarb. Gen. distr.: Iran., Dzu.-Kash., Mong. Described from the Lake Inder area. Type in London.

Note. The species from Uzbekistan (Mel'nikovo station), established by R. Abolin and E. Korovin, *S. spinifera* Abolin et Eug. Korov., is probably merely a form of the species *S. arbuscula* Pall. with flowering branchlets closely beset with flowers and often deflexed; the plant is not spiniferous as the name would imply.

39 Economic importance. The plant is of considerable importance in desert areas as a source of fuel and as winter forage for sheep and camels, available even in cases of heavy snowfall. Analysis of flowering plants from W. Kazakhstan gave the following percentage results (averages of two analyses from Ust-Urt and Kyzyl-Orda): hygroscopic water 6.19, ash 26.07, cellulose 9.54, crude protein 8.94, albumin 6.25, crude fat 1.24, nitrogen-free extract 48.05; starch equivalent 33.54 (I. Larin). The tips of shoots before flowering of Turkestan plants showed 9.16% of hygroscopic water on dry weight basis and, in percentages of absolutely dry weight: crude protein 8.04, crude cellulose 30.31, crude fat 3.00, total ash 14.72, nitrogen-free extract 43.93, albumin 5.59. The plant is used for hide tanning (Agababyan, Granitov, and Kasimenko).

38. *S. arbusculaeformis* Drob. in Trav. Mus. Bot. Ac. Sc. Pétersb. XVI (1916) 142.

Shrublet 20—50 cm high, much branched, with light gray bark; annotinous shoots white, glabrous and smooth (f. *glabra* Iljin), or shoot and leaves minutely hirtellous (f. *hirta* Iljin); leaves alternate, narrowly linear, 10—35 mm long, thickish, terete or subtrigonus-terete, mostly obtusish, dull and commonly glaucous; bracts shorter than leaves, surpassing the broad, obtuse, often suborbicular scarious-margined bracteoles; flowers solitary, in a spiciform inflorescence, greatly exceeding the bracteoles; perianth segments glabrous, pale yellowish, obtuse, scarious-margined, winged in fruit at the middle; wings scarious, reniform, some much narrower, mostly roseate or pale yellow; fruiting perianth including wings 8—14 mm across, the lobes connivent in a steep cone, in lower part adherent to fruit as in *S. arbuscula* and not spreading; anthers separated to the middle or deeper, terminating in a sessile oblong to subovate appendage; stigmas broad, flat, gradually attenuate toward apex, 1.2—2 times as long as the style or of almost equal length. August—September. (Plate XI, Figure 10).

Gravelly debris cones, gravelly and stony slopes of coniform hills and of mountains. — Centr. Asia: Balkh. (in isolated patches), T. Sh. (E.), Pam.-Al. (E.), Syr D., Dzu.-Tarb. Gen. distr.: Dzu.-Kash. Described from the foothills of the Alai Range between Dzhul'ga village and Muyan. Type in Leningrad.

39. *S. laricifolia* (Turcz.) Litw. in Sched ad Herb. Fl. Ross., VIII (1922) 22. — *Halimocnemis laricifolia* Turcz. in Sched., in Herb. Bot. Inst. Ac. Sc. URSS. — Ic.: Drobov in Trav. Mus. Bot. Ac. Sc. Pétersb. t. XVI, f. 1—6; Korovin, Rast. Sr. Az. 132; Acta Univ. As. Med. Ser VIII-b, 21, f. 5.

240 Undershrub 10—30 cm high, in lower woody part profusely cespitose-ramose; branches covered with gray longitudinally fissured bark; annotinous shoots often milky-white; leaves thickish, terete, 5—20 mm long, mostly obtusish, pale green, clustered, on elongated shoots solitary; bracts shorter, surpassing the obtuse semiorbicular bracteoles; flowers smaller than those of the preceding species, surpassing the bracteoles; perianth segments glabrous, lurid or at the center greenish, obtuse, connivent in a cone, winged in fruit; wings mostly reniform, on segments much narrower, scarious, yellowish or faintly roseate.

Gravelly and stony slopes and clayey-solonetzic desert steppes. — Centr. Asia: Ar. -Casp., Balkh., Kyz. K., Kara K., Syr D., T. Sh., Mtn. Turkm. Gen. distr.: Dzu. -Kash., Mong. Described from Mongolia. Type in Leningrad.

Note. A species closely related to the preceding; distinguishable chiefly by the smaller flowers, short greener leaves, and the thorny habit. It may be merely an ecological form of *S. laricifolia*. The species established by E. P. Korovin from R. Abolin's collections from the Toguz-Toraus district, *S. aboloni* Eug. Kor., should probably be referred either to *S. laricifolia* (Turcz.) Litw. or to *S. arbusculaeformis* Drob.

40. *S. montana* Litw., a new mountain saltwort from Russian Turkestan. Petrograd (1917) 3. — Ic.: 1 c.

Shrublet, 40—70 cm high, much branched, with light gray woody branches and milky-white glabrous smooth shoots; leaves alternate, semiterete, 5—20 mm long, obtusish, somewhat convex beneath, almost flat above, dilated at base and constricted above the dilated part, readily falling at the constriction, glabrous, spreading; bracts shorter, surpassing the bracteoles and perianth (except perhaps the uppermost); bracteoles semiorbicular, scarious except for the thickish green back, much shorter than flower; flowers numerous, solitary in the axils, forming a spiciform inflorescence; perianth segments obtusely rounded, white-hyaline-margined, winged in fruit at or just above the middle; wings suborbicular to broadly obovate, thinly scarious, lurid; fruiting perianth including wings 5—7 mm across, the lobes connivent in a rather short gently sloping cone with a central orifice for the exerted filaments; anthers separated beyond the middle to two-thirds of their length, terminating in a small sessile obtuse ovate appendage. Stigmas flat, relatively long, on a very short style or almost sessile. August.

Crags. — Centr. Asia: Pam.-Al. Endemic. Described from Lyangar. Type in Leningrad.

41. *S. maracandica* Iljin in Journ. Bot. de l'URSS, XVIII, 4 (1933) 176.

241 Undershrub, 25—70 cm high, much branched especially in lower part, with light gray bark; annotinous shoots whitish, glabrous, the growth of the current year whitish in lower part, the upper part green and glabrous; leaves alternate, semiterete, narrowly linear, 10—30 mm long, obtuse, glaucescent, glabrous, more or less spreading, the upper ones mostly upcurved, on the whitish portions of shoots dilated at base and constricted above the dilated part, falling readily at the constriction, on the green upper shoots without constriction; bracts leaflike, much longer than bracteoles,

these broad-ovate, scarious, with a broad obtuse green keel; flowers solitary in a spiciform inflorescence, greatly exceeding the bracteoles; perianth segments smoky-roseate, scarious, ovate, obtuse, winged in fruit at the middle; wings semiorbicular, thinly scarious, overlapping, bright, purple; fruiting perianth including wings 6—9 mm across, the lobes broadly triangular, scarious-margined, rather loosely connivent in fruit into a gently sloping fairly short cone; anthers divergent in lower part at least to the middle, terminating in a minute dotlike or ovate sessile appendage; stigmas subulate, flattish in lower part, several times as long as style, sometimes almost sessile. July—August.

Stony slopes. — Centr. Asia: Pam.-Al. Endemic. Described from the Zeravshan River valley between Zakhmat-abad and Oburdon. Type in Leningrad.

Note. This species may be merely a western race of *S. montana* Litw.

42. *S. chiwensis* M. Pop. in Pochv. issl. v bass. r. Syr-Dar'i i Amu-Dar'i, 1 (1915) 49; in O. et B. Fedtsch. Consp. Fl. turk. VI (1916) 355. — *Haloxylon chiwense* M. Pop., l. c. — *Arthrophytum chiwense* M. Pop., l. c.

Undershrub, 30—60 cm high, much branched, finger-thick in the woody part, with pale gray longitudinally fissured bark; one-year-old shoots whitish, glabrous, and smooth; leaves alternate, often fleshy, subclavate, obtuse, slightly narrowing toward base, glaucescent, glabrous, spreading and mostly somewhat arched-upcurved; bracts leaflike, much longer than the semiorbicular narrowly scarious-margined bracteoles; flowers solitary in compact spiciform inflorescences; perianth segments glabrous, winged in fruit; wings faintly yellowish, sometimes rosy-tinged at base, semipellucid, mostly three of them broader, reniform or broadly obovate, two often reduced to narrow appendages; fruiting perianth including wings 7—10 mm across; the lobes appressed to fruit and connivent, caving in from the periphery toward the center, the tips forming a short tubercle at the center of the cavity; filaments long; anthers divergent nearly up to the middle, terminating in small scarious colorless oval appendage; anther 5—6 times longer than the appendage; stigmas thick, flat, obtuse, as long as the style.

Marl slopes. — Centr. Asia: Ar.-Casp. (S.). Endemic. Described from Charyshly well in S. Ust-Urt. Type in Leningrad.

Note. Ulbrich in Engl. u. Prantl, Pflanzenf. 16 c (1934) 563, refers this species quite unjustifiably to *Seidlitzia rosmarinus* (Ehrh.) Bge.

43. *S. richteri* Karel. in Sched. ex Moq. in DC. Prodr. XIII, 2 (1849) 185; Litw. in Sched. ad Herb. Fl. Ross. VIII (1922) 22. — *S. arborescens* var. *richteri* Moq. in DC. Prodr. XIII, 2 (1849) 185 (sphalmate "*Richleri*"). — *S. arbuscula* var. *angustifolia* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 817 et auct. plur. — *S. arbuscula* γ C. A. M. in Eichw. pl. casp.-cauc. (1831—33) 7. — *S. arborescens* β *glabrescens* Moq., l. c., 185. — *S. exasperata* γ C. A. M., l. c., 7. — Ic.: Eichw., l. c., t. XXXI; Paulsen, The Sec. Pamir Exp. (1912) fig. 12. — Exs.: HFR no. 529 (sub *S. arbuscula* var. *angustifolia*), 2567, 2781, and 2568 (var. *androssowi*). Vernacular name: cherkez.

Tree or tall shrub with light gray bark; ultimate branches milky-white, smooth, glabrous or, like the leaves, minutely hirtellous (var. *glabrescens* Litw. in Sched. ad HFR, VIII (1922) 198), often very densely hirtellous with admixture of glandular hairs (var. *androssowi* Litw., l. c., 91); leaves alternate, terete, subfiliform, 40—80 mm long, terminating in a short cartilaginous cusp, at the dilated base gibbous and whitish; bracteoles much shorter than leaves and flowers, semiorbicular, broadly scarious-margined, mucronulate; flowers solitary; perianth segments broadly lanceolate, darkish or smoky, acute or mucronulate from an obtuse apex, narrowly scarious-margined, stiffish, glabrous or scabrous, winged in fruit below the middle; wings scarious, at first reddish, becoming smoky or almost colorless, two of them reniform, the others obovate to linear; fruiting perianth including wings 10—15 (rarely 20) mm across; the lobes above the wings vaulted and connivent into a rather loose beak; anthers divergent to beyond the middle, terminating in a sessile oblong to oblong-ovate yellowish appendage; stigmas flat, acuminate, 1.5—3 times as long as or rarely about equaling the style. June—September. (Plate XI, Figure 11).

Steppe plant communities in sands and on sandhills. — Centr. Asia: Kyz. K., Kara K., Amu D. Gen. distr.: Iran. Described from Turkmenistan. Type in Leningrad.

243 Economic importance. The plant is of importance for consolidation of shifting sands and for ornamental use. According to Agababyan, Granitov, and Kasimenko it is eaten by camels all the year round, and by sheep and horses in fall and winter. Branches of Turkmenian plants before flowering were shown to contain 7—14% hygroscopic water and the following constituents in percentages of dry weight: total ash 18.32, crude protein 29.58, crude fat 2.92, crude cellulose 12.22, nitrogen-free extract 36.95, albumin 20.75. The plant contains the alkaloid salsolin, $C_{10}H_{10}(NH)(OH)(OCH_3)$ (Orekhov). The fresh foliage yields a brown dye. The young shoots are used for soap making (I. Linchevskii).

44. *S. paletzkiana* Litw. in Sched. ad Herb. Fl. Ross. VIII (1922) 91. — Ic.: Litw., l. c., t. IV and V; Korovin, Rast. Sr. Az. 65. — Exs: HFR no. 2569.

Tree to 3—4 m high, many-stemmed, profusely branched; ultimate branches very slender and long, milky-white, glabrous, smooth; bark of older branches light brownish-gray; wood black; leaves alternate, semiterete, thin, linear, 30—70 mm long, mucronulate, glabrous; bracts leaflike; bracteoles short, suborbicular, about equaling the flowering perianth, scarious-margined, abruptly attenuate to thickish cusp ca. 2—3 mm long; perianth segments lanceolate, acuminate, dark, narrowly scarious-margined, glabrous in fruit clustered at center and winged below the middle; wings large, light-colored, subpellucid, silky-lustrous, flabellate; perianth including wings 15—20 mm across; anthers strongly divergent beyond the middle, borne on flat linear filaments, terminating in a narrowly lanceolate pale appendage to 1 mm long; stigmas flat and glabrous, two-thirds as long as to equaling the thick style. June—August.

Sands. — Centr. Asia: Kara K., Amu D. Endemic. Described from the vicinity of Farab railroad station (Turkmenistan). Type in Leningrad.

Economic importance. Used for sand fixation. The sap extracted from the black wood is used for blackening various articles. An ornamental tree of Turkmenistan gardens. Fresh foliage yields a black dye.

45. *S. transhyrcanica* Iljin in Journ. Bot. de l'URSS XVIII, 4 (1933) 277. — *S. exasperata* α C. A. M. in Eichw. Fl. casp.-cauc. (1831—33) 7. — *S. arbuscula* α C. A. M., l. c., 36. — *S. arbuscula* α *exasperata* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 817. — *S. arborescens* α *rugosiuscula* Moq. in DC. Prodr. XIII, 2 (1849) 185 (p. p.). — Ic.: Eichw., l. c., tab. 29.

Shrublet 40—70 cm high, with light gray bark, divaricately branched; young shoots whitish, covered with acute warts; leaves alternate, linear, rather thick and flattish, verrucose like the shoots, 2—3 mm broad, with a prominent midrib beneath, terminating in a sharp cartilaginous cusp or submuticous; bracteoles broad, obtusely keeled, densely pustulose, shorter than flower; flowers solitary; perianth segments stiffish, obtuse, narrowly scarious-margined, scaberulous, obsolete denticulate in lower half, winged in fruit below the middle; wings yellowish, scarious, reniform or broadly obovate, two of them narrower; fruiting perianth including wings 10—13 mm across; the connivent lobes gently vaulting, their tips rising in a central beak; stigmas subulate, as long as or slightly longer than the style. (Plate XI, Figure 12).

Central Asia: Kara K. (Krasnovodsk, Cheleken Island). Endemic. Described from the vicinity of Krasnovodsk. Type in Leningrad.

Series 2. *Roshevitziae* Iljin. — Shoots and leaves hairy; perianth hairy.

46. *S. roshevitzii* Iljin in Journ. Bot. de l'URSS, XVIII, 4 (1933) 277.

Undershrub ca. 25—40 cm high, with light-colored sparingly pubescent or glabrate shoots; leaves alternate, narrowly linear or almost semiterete, 0.75—2 mm broad, obtusish, dilated at the very base and slightly constricted above, sparingly covered with short hairs, incurved; bracts much longer than flowers, surpassing the bracteoles usually arched-upcurved above the enlarged base; bracteoles broad in lower half, keeled, scarious-margined, in upper part abruptly constricted into terete and more or less incurved tips, surpassing the flowers; perianth segments hairy, obtusish, winged in fruit; wings scarious, semiorbicular or broadly obovate, overlapping; fruiting perianth including wings 7—10 mm in diameter, the lobes connivent into a short steep cone open at the summit; anthers divergent up to the middle, terminating in a small scarious oval appendage; stigmas thickish, obtusish, villous on the inside, as long as or slightly shorter than the style. July—August.

Centr. Asia: T. Sh. Endemic. Described from the Naryn River valley. Type in Leningrad.

47. *S. baranovii* Iljin sp. nova in Addenda V, p. 664.

Undershrub, 12—15 cm high, with a stout woody root; serial branches abbreviated, stout, woody, profusely beset with dormant buds and bearing short slender branchlets of the preceding year as well as fruiting or vegetative shoots of the current year; stems of the current year simple, slender, 1—1.5 mm in diameter, loosely covered with short slender implexed hairs; leaves linear, semiterete, 8—12 mm long and ca. 1 mm broad, obtuse, dilated at base and very slightly constricted above the dilated part, readily falling at the constriction, rather densely covered with slender subappressed upright hairs; axillary branchlets much reduced and resembling a bunch

of leaves, obliquely ascending; bracts greatly surpassing the flower, linear, arched-incurved; bracteoles dilated below, somewhat longer than flowers; inflorescence spiciform; flowers solitary in the axils; perianth segments obtuse, broadly scarious-margined, covered especially at tips with flexuous hairs, connivent into a gently sloping cone, winged in fruit at the middle; wings thinly scarious, entire, somewhat overlapping, mostly those of two segments semiorbicular, the others obovate to broadly obovate, at first suberect, subsequently expanded, purple (always?); perianth including wings ca. 8–10 mm in diameter; anthers divergent below up to the middle or beyond, terminating in a small whitish obtuse tuberculate appendage; style ca. 0.5 mm long; stigmas filiform, heavily villous, 1.75–2 mm long, arched-recurved.

Centr. Asia: Pam.-Al. Endemic. Described from the Alai Valley, from the Dzhangali natural boundary area along the Kyzyl-su River. Type in Tashkent.

Section 6. *SPHRAGIDANTHUS* Iljin. — Section *Arbuscula* Ulbrich in Engl. u. Prantl. Pflanzenf. 16c. (1934) 565 (p. p.) and section *Pseudo-noaea* Ulbrich, l. c., 566 (p. p.). — Plants glabrous or covered with short bristles but with no true hairs; leaves acute; fruiting perianth readily caducous; anthers passing imperceptibly into a sessile firm obtuse appendage, the stamens thus apparently unappendaged; stigmas scariously enlarged at tips, their margins crenulate; seeds horizontal.

48. *S. subaphylla* C. A. M. in Eichw. Pl. casp.-cauc. (1831–33) 34; Fenzl in Ldb. Fl. Ross. III, 818. — *Caroxylon subaphyllum* Moq. in DC. Prodr. XIII, 2 (1849) 173. — Ic.: Eichw., l. c., XXIV; Paulsen, The Sec. Pamir Exp. (1912) f. 13. — Exs.: HFR no. 584 et 2782; H. F. A. M. no. 116; pl. turk. ed. H. B. P. no. 35.

Undershrub or shrub 30–120 cm high; stems covered with light gray longitudinally fissured bark, profusely branched, glabrous, pale green or rarely glaucescent, commonly diffusely pustulose; branches mostly spreading; leaves alternate, thickish, linear-terete, sessile, acute, spreading; bracts short, the upper broadly ovate or orbicular and then equaling or shorter than the orbicular scarious-margined carinate bracteoles; flowers solitary in spiciform inflorescences disposed in a panicle; perianth glabrous, exceeding the bracteoles; perianth segments oblong-ovate, broadly scarious-margined, obtuse, winged in fruit below the middle; wings semipellucid, reniform or orbicular or obovate (more rarely some of the wings narrower), mostly overlapping, colorless or roseate, the margins somewhat reflexed; fruiting perianth including wings ca. 10–20 mm across, the lobes above the wings connivent and forming a gently sloping cone; filaments linear, slightly dilated toward base; anthers unappendaged, fused in a circle, divergent up to the middle; stigmas flat, broad, enlarged at the end and crenulate at the summit, subsessile or borne on a short thick style. May–July. (Plate XI, Figure 13).

Sands, argillaceous and gravelly solonetz slopes, and solonchaks. — Centr. Asia: Ar.-Casp. (S.), Balkh. (W.), Kara K., Kyz. K., Mtn. Turkm.,

Amu D., Syr D. Gen. distr.: Iran. Described from Dagoda Island in Balkhan Bay [part of Krasnovodsk Gulf] in the Caspian Sea, near Krasnovodsk. Type in Leningrad.

Note. An exceedingly polymorphic species, occurring under a great variety of ecological conditions. At least three races may be discerned. The most northerly race is characterized by a slight constriction between stigma and style discernible in specimens that are past the flowering stage; it occurs in the Kyzyl-Kum, W. Balkhash, and Fergana areas; it is either light green or glaucous (subsp. *strangulata* Iljin), the latter predominant in the Fergana Valley. Among the more southerly races of lower stature and with imperceptible transition from stigma to style, two forms are readily distinguishable: one associated with gravelly solonchaks, lower in growth, suffrutescent, divaricately much branched, with compact spiciform inflorescences, has fruits with mostly drooping wings (var. *typica* Drob. in Sched. ad HFR, VIII (1922) 199); the other, an arenarious shrub to 150—200 cm high, with looser spikes, has fruits with almost straight or slightly pubescent-pubescent-margined wings (var. *arenaria* Drob., l. c. = *S. arenaria* Iljin in herb.).

Economic importance. The plant is of importance for fixation of shifting sands. According to Agababyan, Granitov, and Kasimenko, it is eaten by camels and sheep all the year round, though more particularly in fall and winter. Plants from Turkmenistan were found to contain 10.40% of hygroscopic water, and in percentages of absolutely dry weight, crude protein 22.99, crude cellulose 19.60, crude fat 4.01, ash 27.29, nitrogen-free extract 26.11, albumin 15.10. Orekhov reports that the plant contains the alkaloid salsolin. The shoots are used for potash extraction (M. Petrov).

49. *S. glauca* M. B. Tabl. d. Prov. occ. casp. (1798) 112; Beschreib. casp. (1800) 144; Fl. taur.-cauc. 1 (1808) 185; Fenzl in Ldb. Fl. Ross. III, 818. — *S. spicata* Pall. (non Willd.) Illustr. (1803) 27. — *Caroxylon glaucum* Moq. in DC. Prodr. XIII, 2 (1849) 173. — Ic.: Pall., l. c., t. 19. — Exs.: Fl. cauc. exs. no. 341; Sintenis It. transcasp.-pers. no. 860a.

Undershrub, 30—75 cm high, distinctly glaucous, with gray woody branches from base; shoots branched, glabrous, the branches obliquely ascending; leaves alternate, terete, convex beneath, flattish above, sessile, acute, mostly somewhat upcurved; bracts broader at base, as long as or more commonly surpassing the perianth; bracteoles in lower part mostly broad-ovate or broader and scarious-margined, in upper part tapering to a slender tip, also about the length of perianth; flowers in a spiciform inflorescence; perianth segments glabrous, scarious-margined, winged in fruit below the middle; wings broadly obovate, overlapping, faintly yellowish or more rarely pale roseate; fruiting perianth including wings 10—15 mm across; lobes above the wings connivent, forming a rather compact cone; filaments linear, dilated toward base; anther divergent below the middle, terminating in an obsolescent oblong obtuse sessile appendage; stigmas flat, enlarged at the end, with scarious crenulate summit, glabrous, half as long as to longer than the style. May—July.

Gypsiferous Tertiary clays, takyrs, and gravelly gypsiferous slopes; growing in groups. — Caucasus: E. and S. Transc.; Centr. Asia: T. Sh. (E.),

Syr D., Mtn. Turkm. Gen. distr.: Iran. Described from the Caucasus (in the first study "inter Kubam et veterem Schamachin," in the second "Kurt-Bulak"). Type in Leningrad.

Note. The species reported by Drobv for the Ichkele-tau mountains (Kazakhstan), *S. planistigma* Drob. does not, in our opinion, differ in any way from *S. glauca* M. B.

Economic importance. According to I. A. Linchevskii, this is a forage plant.

50. *S. hispidula* Bge. in A. H. P. VI, 2 (1880) 437. — *S. glauca* var. *hispidula* Litw. in herb. Bot. Inst. Ac. Sc. URSS. — *Caroxylon hispidulum* Bge. in Reliq. Lehm. (1851) 293. — Exs.: Sintenis, It. transcasp.-pers. no. 1058a.

Undershrub, 30–60 cm high, branching, mostly with several stems, glaucous, densely covered with minute scales visible only with the aid of a magnifier; leaves alternate, semiterete, sessile, acute; bracts and the broader bracteoles mostly slightly shorter than perianth; perianth segments glabrous or mostly hispidulous, scarious-margined, winged in fruit; wings mostly pale, overlapping, broadly obovate or even broader; fruiting perianth including wings 10–15 mm across, the lobes connivent into a cone; filaments linear; anthers divergent at least up to the middle; appendages not readily distinguishable from the anther, obtusish; stigmas flat, enlarged at the end with crenulate summit, as long as or longer than the often very short style. May–July.

248

Takys, argillaceous solonetz habitats, gravelly and sand-and-gravel slopes. — Centr. Asia: Ar.-Casp. (Ust-Urt), T. Sh. (Taldy-Kurgan), Kyz. K., Mtn. Turkm., Syr D. Gen. distr.: Iran. Described from the Kyzyl-Kum Desert. Type in Paris; cotype in Leningrad.

51. *S. iliensis* Lipsky in A. H. P. XXXII, 1 (1912) 6. — Exs.: Pl. turk. ed. H. B. P. fasc. 1, no. 9.

Annual, 10–40 cm high, branching from base, intensely glaucous, glabrous, mostly diffusely pustulose; branches long, widely spreading; leaves alternate, slender, linear-filiform, semiterete, in lower part narrowly scarious-margined, acute or terminating in a minute caducous mucro, spreading and commonly recurved; bracts shorter and broader than the leaves, equaling or scarcely longer than broad-ovate taper-tipped bracteoles and like these expanded in fruit; flowers solitary, forming a spiciform inflorescence; perianth segments broadly scarious-margined, glabrous, obtuse, commonly crenulate at apex, winged in fruit; wings subequal, broadly obovate to suborbicular, semipellucid, yellowish, very rarely rosy-tinged, overlapping, distinctly nerved; fruiting perianth including wings 10–15 mm across, the lobes much thickened and indurated about the keel, connivent at center in a cone and stellately 5-rayed in dorsal view, the rays formed by the keels of the lobes prolonged by the thickened ridges of the wings; filaments broadly linear; anthers divergent nearly to the middle; terminating in a firm yellowish or whitish oblong-ovate to broadly lanceolate appendage; stigmas broad, concave on the inside, glabrous outside, enlarged at the scarious fringed-incised summit, 1.5–2 times the length of the style. May. (Plate XII, Figure 5).

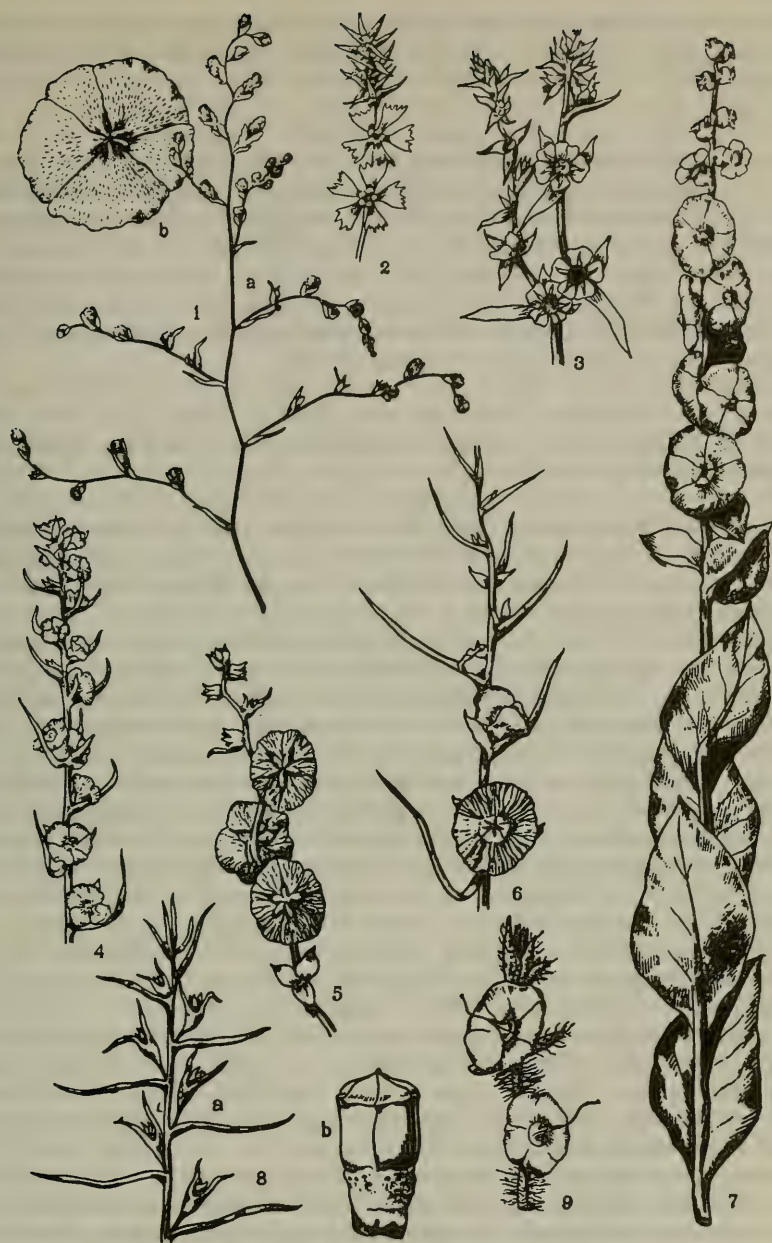


PLATE XII. 1. *Salsola gossypina* Bge.: a) branch, b) flower.— 2. *Horaninowia excellens* Iljin: inflorescence.— 3. *Salsola aperta* Pauls.: inflorescence.— 4. *S. rosacea* L.: same.— 5. *S. siliensis* Lipsky: same.— 6. *S. sogdiana* Bge.: same.— 7. *Aellenia auricula* (Moq.) Ulbrich: same.— 8. *Salsola komarovii* Iljin: a) inflorescence, b) flower in fruiting condition.— 9. *S. longistylota* Iljin: fragment of inflorescence.

Sands, pebbly places, solonchak habitats; sometimes ruderal. — Centr. Asia: Balkh., Kyz. K., Amu D., Syr D. Endemic. Described from the Lake Balkhash area (Ili River). Type in Leningrad.

251 Section 7. *CAROXYLON* (Thunb.) Iljin — *Caroxylon* Thunb. Nov. gen. pl. II (1782) 37; *Caroxylon* Moq. in DC. Prodr. XIII, 2 (1849) 172 (pro parte). — Section *Nitraria* Ulbrich in Engl. u. Prantl, Pflanzenf. 16c (1934) 564 (p. p.). — Section *Ericoides* Ulbrich, l. c., 565 (p. p.). — Section *Pseudonoaea* Ulbrich, l. c., 566 (p. p.). — Bracts and partly leaves minutely gibbous and half-clasping at base; anthers unappendaged or with an obsolescent sessile appendage, the locules fused in upper part; stigmas subulate or filiform; seeds horizontal.

Series 1. *Rigidae* Iljin. — Plants destitute of long implexed hairs in lower part; leaves not deciduous.

52. *S. rigida* Pall. Illustr. (1803) 20; Fenzl in Ldb. Fl. Ross. III, 809. — *S. orientalis* S. G. Gmel. It. IV (1784) 47 (nomen). — Ic.: Pall. Illustr., t. 12; Gmel., l. c., t. 5; Paulsen in Olufsen, The Sec. Pamir Exp. (1912) f. 40. — Exs.: HFR no. 530; H. F. A. M. no. 115.

Undershrub, 15–50 cm high, divaricately much branched from base; branches rough, rigid, woody; annotinous shoots elongated, covered with short crisp hairs and long straight ones, heavily woolly when young (var. *vestita* Fenzl in Ldb., l. c.), later often somewhat glabrescent (var. *calvescens* Fenzl, l. c.); leaves alternate, linear, almost semiterete, obtuse, very slightly dilated and subappressed-hairy at base; bracteoles broad, obtusely keeled, scarious-margined; flowers solitary in a broadly paniculate inflorescence; perianth segments ovate, scarious-margined, hairy, rarely becoming glabrate in fruit, winged at the middle; wings reniform (purple? or roseate? or possibly yellowish turning brown or dark-colored); perianth including wings 7–10 mm across, connivent above the wings into a loose gently sloping cone; anthers obsoletely appendiculate; stigmas short, thickish, flat, villous on the inside, mostly half as long as the thick style. July–September.

Gravelly and argillaceous solonchak deserts, and takyrs; scattered or in groups. — Caucasus: Dag.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Mtn. Turkm., Amu D. Gen. distr.: Iran, Dzu.-Kash. Described from the vicinity of Lake Inder. Gmelin reports it from the eastern shores of the Caspian Sea. Type in Leningrad.

Economic importance. An important source of fuel in desert regions. Eaten by all kinds of livestock, but of particular value as winter feed for camels, sheep, and goats. Analysis of fruit-bearing plants from the Ust-Urt Plateau gave the following percentage composition for the whole aerial part: hygroscopic water 5.45; ash 14.24–15.06, cellulose 16.94–17.92, crude protein 7.98–8.44, albumin 6.16–6.56, amides 0.16–0.17, crude fat 1.82–1.92, nitrogen-free extract 53.57–56.66, soluble carbohydrates 0.55–0.59 and 1.42–1.52 before and after inversions, respectively; starch equivalent 36.88–39.02 (I. Larin).

252 Shoots of flowering plants from Turkmenistan contained 6.52% hygroscopic water in air-dry material; the percentage composition on an absolutely dry weight basis was: crude protein 11.06, albumin 10.62, crude fat 1.32, nitrogen-free extract 44.21, crude cellulose 17.36, ash 26.05 (Agababyan, Granitov, and Kasimenko). A similar analysis, by Abolin and Sovetkina, of plants from the Talas-Susamyr District of the Kirghiz ASSR gave the following results for June and September specimens, respectively: hygroscopic water 6.60, 6.68, ash 26.42, 23.82, cellulose 20.28, 15.77, crude protein 13.74, 5.62, crude fat 1.65, 1.79, nitrogen-free extract 31.31, 41.12.

53. *S. dshungarica* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, II (1936) 129.

Undershrub, 10—30 cm high; stem short, stout, branched at the top; shoots numerous, simple or with subappressed branches in upper part, whitish, covered with short crisp hairs; leaves alternate, terete, obtuse, 5—10 mm long, obliquely ascending, covered with half-spreading articulate obliquely ascending hairs, the abbreviated branchlets in their axils bearing straight divaricately spreading leaves; bracts lanceolate to ovate, in the middle and upper part of the spiciform or paniculate-spiciform inflorescence as long as or very slightly shorter than bracteoles, these broad-ovate, scarious-margined, and as long as or but slightly shorter than flowers; perianth segments ovate, obtuse, membranous except for the green center, ciliate-hairy at apex, in fruit glabrate and winged above the middle; wings membranous, reniform to obovate, roseate or yellowish; fruiting perianth including wings 3—6 mm across, the lobes closely connivent into a cone; anthers unappendaged; stigmas sublinear-subulate, distinctly villous on the inside, as long as the style. August.

Wormwood-and-saltwort steppes. — Centr. Asia: Dzu.-Tarb. (Dzungarian Ala Tau), T. Sh. (E.). Endemic. Described from Tien Shan, the [former] Frunze and Kara-Kenchinskii districts, and the Kashka-Terek River area. Type in Leningrad.

54. *S. laricina* Pall. Illustr. (1803) 21 (excl. syn. I. Gmel.); Fenzl in Ldb. Fl. Ross. III, 811; Shmal'g., Fl. II, 382; Il'in in Fl. Yugo-Vost. IV, 221. — *S. laricina* var. *villosa* Fenzl, l. c., 812. — *S. vermiculata* var. *laricina* Moq. Enum. (1840) 141. — *S. vermiculata* Bge. Reliq. Lehm. (1851) 295; Fenzl, l. c., 810 et auct. plur. ross., non L. — Ic.: Pall., l. c., t. 13. — Exs.: HFR no. 2441.

253 Undershrub, 20—60 cm high, divaricately branched in lower part, the woody branchlets tubercled by scars of fallen leaf clusters; annotinous shoots erect or ascending, at first densely hairy like the leaves, subsequently glabrate or covered with short crisp hairs interspersed with long ones; leaves alternate in clusters on reduced axillary branchlets, linear, subterete, 5—10 mm long, obtusish, very slightly dilated at base, persistent when plant in fruit, green; bracts ovate, obtusely keeled, as long as or slightly shorter than the bracts, these orbicular or rounded-ovate, slightly shorter than flowers; flowers solitary in a paniculate inflorescence; perianth segments ovate, obtuse, mostly crenulate and ciliate, herbaceous in middle part, winged in fruit; wings rather small, reniform or round, the

lobes convergent above the wings; anthers obsoletely appendiculate; stigmas short, long-ciliate, as long as the thickish style; seeds ca. 1.5 mm in diameter. July—September.

Solonetztes, solonetzic steppes, and chalk outcrops; scattered, mostly over considerable areas. — European part: Bl. (S.: Perekop), Crim., L. Don, L. V.; Caucasus: Cisc., Dag., E. Transc.; W. Siberia: U. Tob. (S.), Irt. (S.); Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from the Caspian Desert of the Lower Volga region (earliest report). Type in London.

Economic importance. The ash of this plant yields soda; young shoots are used for food; the plant provides winter forage for livestock (Rollov). The ash content amounts to 7.1% of dry weight and has the following composition: K_2SO_4 9.4150 g, Na_2SO_4 7.1378, NaCl 12.3663, Na_2CO_3 6.8986, free sodium bicarbonate 2.7346; acids: SO_3 8.3352 g, CO_2 2.8577, Cl 7.4626; bases: K 5.0902, Na 16.4931 (Goebel).

Series 2. Nitrariae Iljin. — Plants covered in lower part with long implexed hairs, often glabrescent; leaves deciduous except the floral.

55. *S. nitraria* Pall, Illustr. (1803) 23; Kryl., Fl. Zap. Sib. IV, 955; Il'in in Fl. Yugo-Vost. IV, 219. — *S. spissa* M. B. in Mém. Soc. Nat. Mosc. 1 (1806) 140; Fenzl in Ldb. Fl. Ross. III, 808; Shmal'g., Fl. II, 381. — Ic.: Pall., l. c., t. 15; Paulsen, The Sec. Pamir Exp. (1912) f. 8. — Exs.: HFR no. 2435.

254 Annual, 5—40 cm high, with numerous elongated obliquely ascending branches, grayish by rather sparse and relatively short crisp hairs interspersed with articulate long ones especially in the lower part of young specimens, finally glabrate; leaves alternate, fleshy, terete, short, obtuse, sessile, soon deciduous; bracts broad-ovate, persistent; bracteoles rounded-oval, scarious-margined, about as long as bracts and slightly shorter than perianth; flowers solitary in a paniculate-spiciform inflorescence; perianth segments oblong-ovate to lanceolate, glabrous, herbaceous green at center, winged in fruit at the middle; wings overlapping, membranous, unequally broad, broadly obovate to subrotund, colorless or faintly yellowish or roseate (?), later darkening (to almost black), the margins lighter in color; fruiting perianth including wings 7—10 mm in diameter, the broadly triangular lobes more or less appressed to fruit or more rarely forming a very gently sloping cone; anthers unappendaged or with an appendage reduced to a minute tubercle, divergent to two-thirds of their length; stigmas filiform, long-villous, about as long as the style; seeds horizontal or oblique. July—September.

Takys and solonchak depressions, mainly among sands. European part: L. V.; Caucasus: S. Transc.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D. (?). Gen. distr.: Arm.-Kurd., Dzu.-Kash., Mong. (W.). Described from the Lower Volga region (Zharenyi Bugor near Astrakhan). Type in London.

Economic importance. Eaten by all kinds of livestock, but more particularly by camels, sheep, and goats.

56. *S. macera* Litw. in Sched. ad Herb. Fl. Ross. VIII (1922) 19. — *Salsola* sp. F. et M. in Bull. Soc. Nat. Mosc. XI (1838) 358. — *S. ericoides* Moq. in DC. Prodr. XIII, 2 (1849) 182 (p. p., quoad pl. Hohenack.). — *S. ericoides* var. *bracteolosa* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 813. — Exs.: HFR no. 2438; Pl. or. exs. no. 359.

Annual, 25—60 cm high, erect, profusely and subdivaricately branched from base, hairy in lower part, the upper part glabrous or sparsely covered with fugacious crisp hairs; leaves alternate, subfiliform, to 10 mm long, semiterete, hairy, obtuse, soon deciduous; bracts broad-ovate; bracteoles oval to broad-ovate, narrowly scarious-margined, concave, about as long as or very slightly shorter than the flowers; perianth segments oblong, acute, glabrous, scarious-margined, winged in fruit at the middle; wings membranous, yellowish or roseate, subsequently darkening, unequal, the larger reniform, the narrowest sublinear; fruiting perianth including wings ca. 6—7 mm in diameter, the lobes connivent into a distinct cone; anthers oblong, divergent to between two-thirds and three-fourths their length, minutely appendiculate; stigmas short, villous; style mostly several times as long as or rarely slightly longer than stigma. August.

Sandy solonchaks. — Caucasus: E. Transc. Endemic. Described from the vicinity of Lake Beyuk-Shor in the Baku District. Type in Leningrad.

57. *S. incanescens* C. A. M. in Eichw. pl. casp. -cauc. (1831—33) 35; Fenzl in Ldb. Fl. Ross. III, 809. — *S. spissa* Boiss. (non M. B.) Fl. Or. IV (1879) 954 (pp.). — Ic.: Eichw., l. c., t. 26. — Exs.: HFR no. 483; Sintenis, It. transcasp. -pers. no. 1321, 2199a.

Annual, 15—40 cm high, grayish with dense subdivaricate persistent hairs; branches numerous, obliquely ascending; leaves alternate, terete, short, sessile, obtuse, hairy, soon deciduous; bracts persistent, mostly broad-ovate to suborbicular, scarious-margined, but slightly shorter than flowers; perianth segments scarious-margined, appressed-hairy or more rarely in fruit almost glabrous, winged; wings thin, membranous, reniform (some narrower), colorless or roseate, subsequently blackening; fruiting perianth including wings 6—11 mm in diameter, the lobes appressed to fruit, not closely connivent; anthers divergent to three-fourths, unappendaged or minutely appendiculate; stigmas slender, villous, about as long as style. July—September.

Argillaceous and sandy-argillaceous saline wasteland habitats. — Caucasus: E. Transc. (Salyany); Centr. Asia: Kyz. K. (S.), Kara K., Syr D., Mtn. Turkm., Amu D. Gen. distr.: Iran. Described from Krasnovodsk. Type in Leningrad.

Economic importance. A forage plant, according to I. A. Linchevskii.

58. *S. dendroides* Pall. Illustr. (1803) 22. — *S. verrucosa* M. B. in Mém. Soc. Nat. Mosc. I (1811) 103; Fenzl in Ldb. Fl. Ross. III, 814; Shmal'g., Fl. II, 382; Il'in in Fl. Yugo-Vost. IV, 220. — *S. vermiculata* M. B. Casp. (1798) 145, non L. — *S. ericoides* C. A. M. Ind. cauc. (1831) 160 et auct. plur., non M. B. — *S. foetida* Pauls. Olufs. Pamir Exped. (1903) 200, non Del. — *S. georgica* Bge. ex Fenzl in Ldb. Fl. Ross. III, 2 (1851) 814. — *S. ericaefolia* Adams in Hoffm. Hort. Mosq. (1808), nomen nudum. —

Halogeton georgicus Moq. in DC. Prodr. XIII, 2 (1849) 205. — Ic.: Pall., l. c., tab. 14; Gmel. Fl. sib. III, tab. 21, f. 1 and 2. — Exs.: HFR no. 436, 2436 and 2437; H. F. A. M. no. 117; Pl. or. exs. no. 361.

Undershrub, 75—150 cm high, with a stout stem 5—10 cm in height; branches long, branching only at the ends, grayish-green, densely covered with crisp hairs sometimes interspersed with long ones; leaves alternate, small, 2—5 mm long, linear, fleshy, obtuse, very slightly dilated at base, later deciduous; bracts ovate-triangular, keeled, often half as long as the suborbicular scarious-margined bracteoles; flowers numerous, solitary, forming a dense widely paniculate inflorescence; perianth segments ovate, obtuse, membranous except for the herbaceous center, winged in fruit; wings semiorbicular or obovate, colorless, yellowish or roseate; lobes of fruiting perianth connivent; anthers obsoletely appendiculate; stigmas flat, thickish, long-villous, as long as or very slightly longer than the style; seeds ca. 1.5 mm in diameter. July—September.

Solonchaks, especially puffy, gypsiferous clays, argillaceous saline sierozeoms, in river valleys, and as weed of irrigated crops; in groups. — European part: L. V.; Caucasus: Cisc., Dag., S. and E. Transc.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Mtn. Turkm., Amu D., Syr D. Gen. distr.: Arm.-Kurd., Iran. Described from the northern shores of the Caspian Sea between the Kuma and Volga rivers and also between the Volga and Ural rivers. Type in London.

256 **Economic importance.** Used as a source of potash for domestic production of soap. Also provides material for broom making. Eaten by sheep and camels, especially in winter. The hygroscopic water content of air-dry nonflowering shoots from Turkmenistan was 10.57 percent. The percentage composition on a dry weight basis was: ash 36.34, crude protein 17.48, albumin 11.191, crude fat 2.00, nitrogen-free extract 28.54, crude cellulose 15.64. The composition of shoots collected during winter in Turkmenistan was: hygroscopic water 6.72, ash 27.95, crude protein 8.94, albumin 8.563; crude fat 2.28, nitrogen-free extract 42.73, crude cellulose 18.12 (Agababayan, Granitov, and Kasimenko).

59. *S. ericoides* M. B. Fl. taur.-cauc. I (1808) 187 et III (1819) 180; M. B. in Mém. Soc. Nat. Mosc. I (1811) 141; Fenzl in Ldb. Fl. Ross. III, 813. — *S. caesia* F. et M. in Hohen. Enum. Talysch (1838) 121. — *S. glauca* C. A. M. Verzeichn. Pflanz. Cauc.-casp. (1831) 160, non M. B. — Exs.: Fl. cauc. exs. no. 339; Pl. or. exs., no. 383.

Shrublet 30—60 cm high, profusely branched; woody branches with light gray bark; young shoots rather sparsely puberulent, becoming glabrate, pale or glaucescent; leaves numerous, alternate, closely approximate, sessile, mostly 3—5 mm long, on principal shoots to 12 mm long but promptly deciduous, all fleshy, semiterete, obtuse, slightly concave above; bracteoles suborbicular, scarious-margined, obtusely keeled, at anthesis as long as perianth, in fruit shorter; perianth segments glabrous, obtuse or very slightly retuse, scarious-margined, winged in fruit at or scarcely above the middle; wings membranous, overlapping, two of them reniform, the others obovate or linear; fruiting perianth including wings ca. 6—8 mm across, the broadly triangular lobes connivent into a very short cone, separated from the wings by a conspicuous impressed line; anthers

divergent beyond the middle, minutely appendiculate; stigmas short, flat, 1—1.5 times as long as the style, villous on the inside, horizontally spreading.

Solonchaks, especially puffy. — Caucasus: Cisc. (Terek), Dag., E. and S. Transc. Gen. distr.: Arm.-Kurd. Described from steppes in the area of the Kuma and Kura rivers. Type in Leningrad.

Economic importance. Used for extraction of soda.

Section 8. *ALEURANTHUS* Iljin — Section *Nitraria* Ulbrich in Engl. u. Prantl. Pflanzenf. 16c (1934) 564 (p. p.). — Farinose plants; anthers with a sessile obtuse appendage and anthers fused at the tips; stigmas scarcely enlarged at the tips; seeds horizontal.

257 60. *S. sclerantha* C. A. M. in Eichw. Pl. casp.-cauc. (1831—33) 35; Fenzl in Ldb. Fl. Ross. III, 807. — Ic.: Eichw., l. c., t. 27. — Exs.: HFR no. 637.

Annual, 10—30 cm high, profusely branched from base, at least in upper part farinose by slender bladdery hairs, sometimes interspersed with short crisp ones, in lower part densely covered with long slender tangled and largely fugacious hairs; leaves alternate, terete, dilated at base, obtuse, implexed-hairy, deciduous when plant in fruit; bracts very short, rarely equaling and mostly shorter than the semiorbicular obtusely keeled farinose bracteoles; flowers solitary, remote; perianth much longer than bracteoles, 3—5 mm long at anthesis, heavily clothed with bladdery scales and usually with some simple hairs, scarious-margined, winged in fruit below the middle; wings membranous, often stiffish, rounded-obovate or oblong-spatulate, yellow or roseate or purple turning yellowish; fruiting perianth including wings 7—12 mm across, the lobes pyramidally connivent, the inflexed margins forming slits; anthers divergent well beyond the middle, terminating in a sessile ovate obtuse appendage; style as long as or mostly several times as long as stigmas, these obtusish, often slightly enlarged at tips. July—August. (Plate XI, Figure 14).

Sands, sandy-argillaceous saline expanses, and rarely stony places; scattered or solitary. — Centr. Asia: Ar.-Casp. (Ust-Urt), Balkh., Kyz. K., Kara K., Syr D., Amu D., Pam.-Al. (Roshan). Gen. distr.: Iran. Described from Dagoda Island near Krasnovodsk. Type in Leningrad.

Economic importance. According to Agababyan, Granitov, and Kasimenko, the plant is eaten all the year round by camels and sheep.

61. *S. carinata* C. A. M. in Eichw. Pl. casp.-cauc. (1831—33) 36; Fenzl in Ldb. Fl. Ross. III, 807. — *S. sclerantha* var. *carinata* Minkw. in O. et B. Fedtsch. Consp. Fl. Turk. VI (1916) 243. — *S. leptoclada* Gandog. in Bull. Soc. Bot. Franc. XL (1913) 421. — Ic.: Eichw., l. c., t. XXVIII. — Exs.: HFR no. 1891; Pl. turk. ed. H. B. P. no. 65.

Annual, 10—45 cm high, mostly divaricately branched from base, commonly many-stemmed, grayish-farinose by bladdery chaff, in lower part covered with long slender tangled hairs mostly falling after flowering, in upper part more sparsely covered with shorter hairs or merely farinose; leaves alternate, terete, sessile, obtusish, hairy, spreading, commonly deciduous when plant in fruit; bracts mostly somewhat curved, very slightly shorter to somewhat longer than the broad-ovate to almost

semiorbicular bracteoles; perianth greatly surpassing the bracteoles, 1.5—2.5 mm long at anthesis; segments scarious-margined, heavily lepidote, often with scattered hairs, winged in fruit about the middle; wings ovate or oval or narrowly lanceolate, broader at the middle or at base, mostly acute or acuminate, keeled at center, mostly lepidote; fruiting perianth including wings ca. 6.5—10 mm across, the semiappressed lobes incurved and not covering the fruit; anthers divergent beyond the middle, terminating in a small ovate obtuse sessile appendage several times shorter than anther; stigmas subfiliform, sometimes very slightly enlarged at tips, prolonged, as long as or one-half to two-thirds as long as style. August—September. (Plate XI, Figure 15).

Solonchak depressions among sands, margins of takyr, saline meadows, loess slopes, and more rarely old fields. — Centr. Asia: Balkh. (W.), Kyz. K., Kara K., Mtn. Turkm., Amu D., Syr D. Gen. distr.: Iran. Described from the vicinity of Krasnovodsk. Type in Leningrad.

Economic importance. A forage plant, according to I. A. Linchevskii.

Note. The plant *S. turkestanica* Litw. (in Trav. Mus. Bot. Ac. Sc. Pétersb. VII, 1910, 78) differs from the typical in lower growth, fewer branches, and more pronounced hairiness. Other characters indicated by the author are shared by the typical forms; even the characters mentioned above are insufficiently distinctive and very variable. If the name is to be retained, it should merely be a form designation (*f. turkestanica* (Litw.) Iljin).

Section 9. *BELANTHERA* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, III (1936). — Section *Nitraria*, *Ericoides* et *Pseudonoaea* Ulbrich in Engl. u. Prantl, Pflanzenf. 16c (1934) 564—66 (p. p.). — Anther locules free up to the summit and joined only by the acuminate oblong-ovate or lanceolate appendage; seeds horizontal or vertical.

62. *S. nodulosa* (Moq.) Iljin in Fl. Yugo-Vost. IV (1930) 222; Grossg., Fl. Kavk. II, 78. — *Caroxylon nodulosum* Moq. in DC. Prodr. XIII, 2 (1849) 177. — *Salsola gemmascens* Fenzl in Ldb. Fl. Ross. (p. p., specim. cauc.) et auct. cauc., non Pall. — Ic.: Fl. Yugo-Vost. IV, fig. 286. — Exs.: Fl. cauc. exs. no. 340.

259 Undershrub, 10—30 cm high, divaricately branched, grayish by a dense cover of pellucid often 2-tipped scales; branchlets densely beset with subglobular buds; leaves alternate, not more than 3 mm long, subtrigonous-subulate, slightly dilated and shortly gibbous at base, obtuse; bracts ovate, convex on the back, with gibbous base appressed to stem, half as long as bracteoles, these suborbicular, half the length of the perianth, carinate; flowers solitary, forming a dense spiciform inflorescence; perianth segments ovate, obtusish, chaffy in upper part, winged in fruit; wings reniform or broadly obovate, purple or buff; anthers terminating in an oblong-ovate appendage; stigmas subulate, glabrate, somewhat longer than style; seed horizontal, 1.75—2 mm in diameter. July—September.

Solonchaks and solonchaks mountain slopes. — European part: L. V. (?) (reported for the vicinity of Astrakhan); Caucasus: E. Transc. Endemic. Described from Sal'an (Baku District). Type in Paris; cotype in Leningrad.

Economic importance. The ash is used for extraction of soda. Of interest for ornamental use.

63. *S. gemmascens* Pall. Illustr. (1803) 24; Fenzl in Ldb. Fl. Ross. III, 815 (p. p.); Bge in A. H. P. VI, 2, 436. — Ic.: Pall., l. c., t. 16. — Exs.: HFR no. 2442.

Undershrub, 15—50 cm high, branched from base; woody twigs with grayish bark; annotinous shoots herbaceous, covered with mostly 2-tipped pellucid scales, bearing in the leaf axils and on reduced branchlets numerous subglobose buds densely covered with similar scales; buds on the woody branches usually persistent; leaves alternate, short, trigonous-subulate, appressed to stem at the dilated gibbous base, slightly concave above, lepidote, soon wilting; bracts broader, often ovate, similarly gibbous, shorter than the broad suborbicular obtusely keeled bracteoles; flowers solitary; perianth segments obtusish, winged in fruit; wings yellow or roseate, reniform or obovate; fruiting perianth including wings 7—10 mm across, connivent into a cone and covered with scales as described above; anthers with linear locules divergent up to the summit; appendage yellowish, oblong-ovate to broadly lanceolate, acute, one-third to one-half the length of the anther; stigmas broad, flat, obtusish, glabrous, distinctly purple on the inside; seeds horizontal, oblique or vertical. June—August. (Plate XIII, Figure 4 a—b).

Takyr; solonchak, clayey, or chalky slopes, conglomerates, and more rarely rocks. — Centr. Asia: Ar.-Casp. (S.), Kara K. (S.), Syr D., Mtn. Turkm., Amu D., T. Sh., Pam.-Al. Gen. distr.: Iran., Mong. Described from the E. coast of the Caspian Sea, from Turkmenia. Type in London.

260 **Note.** Specimens from E. Tien Shan differ to some extent from the type and resemble the Mongolian in habit, lower growth, closely approximate and relatively small buds, shoots densely arising from the short stout main stem, the subulate styles reminiscent of those of the Caucasian *S. nodulosa* (Moq.) Iljin, and the rather narrow acuminate anther appendage. Bunge separated the Mongolian specimens as *S. passerina* Bge. but did not publish the name. In my opinion, the name should have been retained for the Mongolian species. The position of numerous Semireche [Dzhety-Su] specimens to the latter species needs checking against amply collected material.

Economic importance. The plant provides good winter forage for camels, sheep, and goats; in the case of camels, it acts as fattening feed. Analysis of fruit-bearing plants from Kazakhstan (Ust-Urt) gave the following composition in percentages of air-dry weight: hygroscopic water 6.84, ash 26.20—28.15, cellulose 14.31—15.35, crude protein 8.21—8.81, albumin 5.61—5.70, crude fat 2.32—2.49, nitrogen-free extract 42.12—45.20; starch equivalent 30.42—34.33 (I. Larin). Shoots from Turkmenistan before flowering had the following air-dry weight percentage composition: hygroscopic water 12.13, ash 34.86, crude protein 9.94, albumin 8.31, crude fat 3.01, nitrogen-free extract 28.02, crude cellulose 24.17, digestible protein 3.54, digestible fat 4.47—4.76, digestible nitrogen-free extract 3.09—1.62, digestible cellulose 18.43; starch equivalent 17.36 (Agababyan, Granitov, and Kasimenko).

64. *S. cana* C. Koch in *Linnaea* XXII (1849) 190; XXIV (1851) 91. — *Noaea cana* Fom. (non Litw.) in Sched. ad Fl. cauc. exs. — Exs.: Fl. cauc. exs. no. 205 (sub *Noaea cana*).

Undershrub, 20–30 (40) cm high, cinerescens; woody branches short; anootinous shoots brittle, branched, covered with short appressed hairs; leaves alternate, thickish, somewhat convex beneath, flat above, obtuse, sessile, without constriction, whitish-gray by rather long appressed obsoletely serrulate hairs; bracts shorter; bracteoles broad-ovate, convex below, attenuate toward apex, as long as or slightly longer than flowers; perianth segments acuminate, membranous, covered with long appressed hairs, winged in fruit; wings membranous, blackish-purple, overlapping, some reniform, others narrower; fruiting perianth including wings 8–10 mm in diameter, the lobes connivent into a cone; anthers linear, divergent right up to the appendage, this lanceolate, acuminate, lurid, densely beset with minute acute papillae, about as long as the anther; stigmas acute, flattish in lower part, 1–1.5 times as long as the style; seeds vertical or oblique.

Stony habitats. — Caucasus: S. Transc. Described from the Araks River valley in Armenia. Type in Berlin; cotype in Leningrad.

- 261 65. *S. aucheri* Bge. in Herb. Inst. Bot. Ac. Sc. URSS. — *Noaea cana* Litw. in Sched. ad Herb. Fl. Ross. 2 (1900) 11. — *Noaea aucheri* Moq. in DC. Prodr. XIII, 2 (1849) 207. — Exs.: HFR no. 231 (sub *Noaea cana*).

Shrublet, 30–80 cm high, cinereous, profusely branched, with light gray bark; shoots brittle, whitish, covered with very short appressed hairs; leaves alternate, narrowly linear-terete, fleshy, obtuse, covered with short appressed hairs, subsequently glabrescent, glaucous, dilated at base and constricted above the dilated part, easily falling off at the constriction; bracts leaflike; bracteoles about the length of the perianth, broad at base, attenuate to a leaflike tip; flowers solitary in a spiciform inflorescence; perianth segments acuminate, covered with short appressed hairs, winged in fruit just below the middle; wings membranous, suborbicular or reniform, some obovate or elliptic, dark reddish to almost blackish-red; fruiting perianth including wings 8–10 mm in diameter, the lobes connivent into an often fairly loose cone; anthers linear, divergent almost to the middle, terminating in a sessile lanceolate acute pale appendage covered with obsolescent acute papillae and slightly shorter than anther; stigmas subulate, as long as or slightly shorter than style, connivent; seeds vertical or oblique. August–September. (Plate XIII, Figure 5 a, b).

Gravelly slopes. — Centr. Asia: Mtn. Turkm. Gen. distr.: Iran. Described from Iran. Type in Paris.

Economic importance. A forage plant, according to I. A. Linchevskii, apparently for camels and sheep.

66. *S. takhtadshjanii* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, III (1936). — *S. aurantiaca* auct. turk., non Bge.

Undershrub, 20–40 cm high, profusely branched from base; stem covered with subappressed somewhat tangled rough hairs; shoots pale, rather slender; leaves alternate, semiterete, dilated at base, obtuse,

covered with similar upward-appressed hairs, more or less spreading; bracts and the broad-ovate obtusely keeled bracteoles slightly shorter than to about as long as the perianth; perianth segments membranous, covered with rather long straight (not crisp) crenulate hairs, winged in fruit below the middle; wings membranous, reniform or broadly obovate, orange becoming blackish; fruiting perianth including wings 6–8 mm in diameter, the lobes rising into a beak from a subhorizontal lower part; anthers linear, subdivergent throughout; appendage lanceolate, acuminate, apparently sessile, pale or roseate, almost smooth, readily caducous, as long as the anther; stigmas subulate, as long as or very slightly longer than the style; seeds horizontal or oblique.

Takyr. — Caucasus: S. Transc. (Dzhul'fa); Centr. Asia: Mtn. Turkm. (Arman-Sagad, Atrek). Gen. distr.: Iran. Described from Dzhul'fa. Type in Leningrad.

67. *S. stellulata* Eug. Kor. in Addenda V, p. 665.

A small undershrub, 10–20 cm high, much branched from the base; shoots often procumbent and ascending, covered like the leaves with short branched hairs; leaves semiterete, averaging 5–10 mm in length, the upper ones shorter, obtuse, sessile, somewhat dilated at base, spreading; bracts ovate or broader, much shorter than the obtusely keeled ovate bracteoles, these about as long as or slightly shorter than the flowers; perianth segments membranous, covered on the outside with short hairs interspersed with long antrorsely appressed prickly hairs, winged in fruit; wings membranous, mostly purple, reniform, two of the segments often wingless or obsoletely winged; fruiting perianth including wings 5–7 mm across, the lobes forming a gently sloping beak; anthers divergent right up to the summit; appendage pale, lanceolate, acuminate, scabrous, as long as the anther; stigmas subulate, about as long as the style. (Plate XIII, Figure 6 a–d).

Solonchaks. — Centr. Asia: Mtn. Turkm. (Kzyl-Arvat). Endemic. Described from Turkmenia. Type in Tashkent.

68. *S. vvedenskyi* Iljin et M. Pop. in Addenda V, p. 664.

Annual, 15–40 cm high, light gray, branched, very densely covered with short, short-branched hairs interspersed with long spreading articulate denticulate hairs; leaves alternate, thickish, terete, slightly thicker at base, obtusish, rather crowded at the base of the stem; bracts shorter, slightly shorter to slightly longer than the bracteoles, these dilated at base; bracts and bracteoles closely convergent at the flowering and early fruiting stages, subsequently expanding with the development of the wings; flowers solitary, shorter than the bracteoles, the hairy perianth winged in fruit above the middle; wings thin, membranous, reniform or suborbicular, yellowish (?), turning almost black, overlapping; fruiting perianth including wings 7–10 mm in diameter, the shortly connivent lobes terminating in a tuft of bristles; anthers with locules divergent to the summit; appendage long, slender, lanceolate, colorless, subobtuse; stigmas filiform, long, many times the length of the very short style; fruits vertical or horizontal and then with margins very slightly upcurved above the horizontal seed, with a dome-shaped top. (Plate XIII, Figure 3 a, b).

Centr. Asia: Pam.-Al. (Tadzhikistan). Endemic. Described from the vicinity of Kelif. Type in Leningrad.

Note. This plant was referred without any justification to the genus *Halanthium* (*H. popovii* Gran. — Granitov in Khoz. Osv. pustyn' Sr. Azii, 1934. Tashkent, p. 136). Attempts to set it up as a separate genus are even more groundless.

69. *S. forcipitata* Iljin in Journ. Bot. de l'URSS, XVIII, 4 (1933) 276.

Annual, 10—30 cm high, divaricately branched from base, densely grayish-farinose by bladdery hairs and in lower part also covered with long spreading articulate bristles; leaves alternate, terete, covered with spreading bristles, apiculate with a mostly upcurved tip, deciduous when plant in flower; bracts very short and broad, shorter than the almost semiorbicular bracteoles; flowers solitary, at least twice the length of the bracteoles; perianth 3.5—5 mm long; segments obtusish, densely covered with bladdery and often simple hairs, winged in fruit; wings membranous, semiorbicular or reniform (two or three much narrower than the rest), overlapping, glabrous, at least initially rosy-purple; lobes of the fruiting perianth with somewhat involute margins, connivent in a low gently sloping cone; anthers terminating in a sessile ovate apiculate appendage, divergent right up to the appendage; stigmas broadly linear, canaliculate, crenate at the enlarged scarious apex, yellowish, often roseate-tinged at tips, not recurved and rather infundibular, mostly 1—1.5 times as long as the style; seeds horizontal. August—September. (Plate XIII, Figure 2 a, b).

Mountain slopes. — Centr. Asia: Pam.-Al. (Tadzhikistan). Endemic. Described from the banks of the Amu Darya River between the settlements of Ovrazhnyi and Ormenek. Type in Leningrad.

70. *S. gossypina* Bge. in Boiss. Fl. Or. IV (1879) 956; Litw. in Sched. ad Herb. Fl. Ross. II (1900) 9. — Exs.: HFR no. 229 et no. 30 (sub *S. crassa* var. *tomentosa*); Sintenis, It. transcasp.-pers. no. 1233 et 2191a.

264 Annual, 10—50 cm high, divaricately much branched from the base, hairy; branches slender, often dark brown and mostly zigzag, bearing cyathiform or obconic flower buds densely enveloped by long implexed hairs; leaves linear, semiterete, gradually dilated toward base, wilting before flowering time, hairy, the lower enveloped together with lower part of stem in long implexed hairs, these subsequently thinning out considerably or falling altogether; bracts obtuse, becoming shorter and broader up the stem, the terminal subovate to ovate-orbicular; bracteoles broad-ovate, obtusely carinate; flowers solitary, borne almost to the stem base, forming a broadly paniculate spreading inflorescence; perianth segments broadly lanceolate, obtusish, membranous, densely winged above the base of wings, winged in fruit above the middle; wings broad-oval or obovate or broader, some much narrower, faintly nerved, at first golden-yellow, becoming orange and finally sanguine, blackening in wilting and drying; fruiting perianth including wings 5—10 mm across; anthers divergent throughout; appendages lanceolate, acuminate, white, about as long as anther; filaments linear; stigmas two-thirds as long as to equaling the style, glabrous, terminating in slender scarious recurved tips; seeds ca. 2 mm long, vertical or oblique or horizontal. July—September. (Plate XII, Figure 1 a, b).

Saline, gypsiferous clays, and chalk outcrops. — Centr. Asia: Ar.-Casp. (S.), Mtn. Turkm. Gen. distr.: Iran. Described from the vicinity of Akhmetabad to the east of Meshed (Khurasan). Type in Leningrad.

Economic importance. A forage plant, according to I. A. Linchevskii.

71. *S. daghestanica* (Turcz.) Lipsky in A. H. P. XIV (1897) 295; Grossg., Fl. Kavk. II, 77. — *Noaea daghestanica* Turcz. in Bge, Anab. rev. (1862) 26; Boiss. Fl. Or. IV, 966. — Exs.: Herb. Fl. cauc., no. 170.

Undershrub, 30–100 cm high, pale green, with numerous erect stems covered with faint fugacious pubescence; leaves alternate, narrowly scarious, subterete, convex beneath, subcanaliculate above, sessile, acute or acuminate, covered with short hairs or glabrous, mostly sharply scabrous, with axillary clusters of reduced branchlets; bracts slightly longer than bracteoles, these broad at base, scarious-margined, carinate, abruptly passing into a long herbaceous tip equaling or surpassing the perianth; flowers solitary; perianth segments glabrous, membranous, obtusish or rarely minutely mucronulate, winged in fruit below the middle; wings broad, semiorbicular, pale; fruiting perianth including wings ca. 6 mm across, the lobes suberect, loosely connivent; stamens with narrowly linear filaments and anthers strongly divergent nearly to the summit; appendages of anthers sessile, lanceolate, acuminate, half as long as the anther; stigmas subfiliform, glabrous, several times the length of the very short style; seeds horizontal or more rarely vertical. August.

Dry clayey and stony places. — Caucasus: Dag. Endemic. Described from Dagestan. Type in Leningrad.

Section 10. *COCCOSALSOLA* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 802. — Section *Salsolaria* Moq. Chenop. enum. (1840) 144 (partim), excl. *S. lanata*, *S. recurva*, *S. tamariscina*; Section *Nitraria* Ulbrich in Engl. u. Prantl, Pflanzenf. 16c (1934) 564 (p. p.). — Anthers unappendaged; stigmas very short, less than 1 mm in length, sessile; fruit berrylike; seed horizontal.

72. *S. foliosa* (L.) Schrad. in Roem. et Schult. Syst. VI (1820) 235; Kryl., Fl. Zap. Sib. IV, 952. — *Anabasis foliosa* L. sp. pl. (1753) 223. — *A. foliata* Pall. It. I (1771) 422. — *A. clavata* Pall. It. II (1773) 41. — *Salsola clavifolia* Pall. It. II (1773) 486; Fenzl in Ldb. Fl. Ross. III, 802; Shmal'g., Fl. II, 381; Il'in in Fl. Yugo-Vost. IV, 211. — *S. baccifera* Pall. Illustr. (1803) 31. — *S. baccata* Pall. It. I (1771) 178, non Poir. (sec. Trautv.). — Ic.: Pall. Illustr., t. 23.

Annual, 15–80 cm high, quite glabrous, glaucous, very succulent, mostly turning dark in drying, densely branched from base; leaves numerous, alternate, short, subcylindric, claviformly thickened and arcuately upcurved; flowers crowded in glomerules of several borne in the leaf axils nearly down to the very base of the stem and subtended by broad obtuse scarious-margined bracteoles shorter than fruiting perianth; perianth segments membranous, rounded-ovate or elliptic, 1-nerved, united only at base, winged in fruit; wings stramineous, semiorbicular, entire; anthers

unappendaged; stigmas very short, sessile; fruit berrylike. August—September. (Plate XIII, Figure 1 a, b).

Solonetzes and solonetzic steppes, mostly as a ruderal plant; growing in groups. — European part: Transv. (S.); L. Don, L. V.; Caucasus: Cisc., Dag., E. Transc.; W. Siberia: U. Tob. (S.), Irt. (S.); Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D. Gen. distr.: Dzu.-Kash., Mong. Described from the shores of the Caspian Sea. Type in London.

Economic importance. May be used for home production of soda. Analysis of young specimens from the Lower Volga region showed an ash content amounting to 42% of air-dry weight, of this 74% water-soluble, with the following composition: K_2SO_4 1.3095 g, KCl 12.4389, Na_2CO_3 43.8388, free sodium bicarbonate 6.7907. In old specimens the ash content was 22.36, with 70% water-soluble and containing K_2SO_4 0.7482 g, KCl 8.7501, NaCl 5.0117, Na_2CO_3 45.990, and free sodium bicarbonate 6.7907 (Goebel).

266

Genus 426. **NOAEA*** MOQ.

Moq. in DC. Prodr. XIII, 2 (1849) 207.

Flowers perfect, 5-merous; perianth narrow, much longer than broad; segments of fruiting perianth winged below the middle; stamens 5, with long filaments, the anthers terminating in a small rather firm appendage; stigmas 2, subulate; ovary vertical; seed with spiral embryo. Stiffish plants with alternate narrow leaves. The genus contains 7 species.

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|---------------------------------------|--|
| 1. Annual plants | 3. <i>N. minuta</i> Boiss. et Bal. |
| + Undershrubs | 2. |
| 2. Branches spiny-tipped | 1. <i>N. mucronata</i> (Forsk.) Asch. et Schw. |
| + Branches not spiny-tipped | 2. <i>N. leptoclada</i> (Woron.) Iljin. |

1. *N. mucronata* (Forsk.) Asch. et Schweinf. III. Fl. Egypt. in Mém. Inst. Egypt. II (1887) 131. — *Salsola mucronata* Forsk. Fl. Aeg.-Arab. (1775) 56. — *Anabasis spinosissima* L. f. Suppl. (1781) 173. — *A. echinus* M. B. Casp. (1800) 152. — *Halogeton spinosissimus* C. A. M. Verzeichn. (1831) 159; Fenzl in Ldb. Fl. Ross. III, 831. — *Noëa spinosissima* Moq. in DC. Prodr. XIII, 2 (1849) 209; Boiss. Fl. Or. IV, 965. — *Salsola spinifera* Pall. Illustr. (1803) 32. — Ic.: Pall., l. c., t. 24. — Exs.: HFR no. 389; Herb. Fl. Cauc., no. 171.

Undershrub or small shrub, 20—75 cm high; shoots glaucous, very rarely green, whitish below, divaricately branched, glabrous or scabrous; all twigs horizontally or subarcuately recurved, spiny-tipped like the stem; leaves alternate, glabrous or scabrous, filiform, acute, slightly dilated at base, the lower 3—5 cm long, soon wilting and deciduous, the others shorter; bracts and bracteoles barely shorter to slightly longer than flowers; bracteoles ovate to oblong-ovate, navicular, prominently keeled, mostly with a tuberclelike protuberance at base; flowers solitary; perianth segments distinct, obtuse, obsoletely mucronulate, winged in fruit; wings obovate to oblong-obovate or narrower, membranous, yellowish (or rose-tinted?), later often mottled-smoky; anthers divergent to below the middle,

* Named for Frank Vicomte de Noë, late director of the Constantinople Botanical Garden.



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PLATE XIII. 1. *Salsola foliosa* (L.) Schrad.: a) branch, b) perianth.— 2. *S. forcipitata* Iljin: a) habit, b) perianth.— 3. *S. vvedenskyi* Iljin et M. Pop.: a) branch, b) perianth.— 4. *S. nodulosa* (Moq.) Iljin: a) branch, b) perianth.— 5. *S. aucheri* Bge.: a) branch, b) perianth.— 6. *S. stellulata* Eug. Kor.: a) branch, b) perianth, c) hair, d) anther.— 7. *Noëa mucronata* (Forsk.) Asch. et Schw.: a) branch, b) flower in side view, c) same in dorsal view.— 8. *Rhaphidophyton regelii* (Bge.) Iljin: a) branch, b) flower.

terminating in a small acutish sessile ovate or oblong-ovate firm appendage one-fifth to one-fourth as long as the anther; stigmas narrowly subulate, as long as or slightly shorter than the style; seed oval, ca. 2 mm long, completely filling the ovary. July — September. (Plate XIII, Figure 7 a—c).

Rocks, taluses, and stony or more rarely clayey slopes. — Caucasus: Dag., W., S., and E. Transc.; Centr. Asia: Mtn. Turkm., Pam. — Al. (around Samarkand). Gen. distr.: Med. (Egypt), Bal. (Greece), As. Min., Arm. — Kurd., Iran. Described from Egypt. Type in Copenhagen.

Economic importance. The plant can be used for extraction of soda (Rollov).

2. *N. leptoclada* (Woron.) Iljin comb. nova. — *Noaea tournefortii* var. *leptoclados* Woron. in Sched. Busch., Marcowicz et Woron. Fl. cauc. exs. XI—XIV (1909) 22. — Exs.: Fl. cauc. exs. no. 338.

Undershrub 40—75 cm high, glaucous, glabrous and smooth; annotinous shoots with branches at an acute angle; leaves filiform, acute, 1—3 cm long and ca. 1 mm broad; bracts scarcely longer than or about equaling the flowers; bracteoles broadly lanceolate or oblong-ovate, acute, distinctly keeled, with a small tuberclelike protuberance at base, scarcely shorter to longer than the flower; flowers solitary; perianth segments membranous, terminating in a minute soft mucro, developing winglike outgrowths in fruit; anthers divergent to less than half their length, terminating in an ovate to oblong-ovate sessile acute appendage usually one-fifth the length of the anther; stigmas subulate, somewhat shorter than the style. July — August.

Taluses and stony or clayey slopes. — Caucasus: W. Transc. Gen. distr.: Asia Minor? Described from near the settlement of Lomashen in the Artvin District. Type in Leningrad.

Note. A related species, *N. tournefortii* (Spach) Moq. in DC. Prodr. XIII, 2 (1849) 208 = (*Anabasis tournefortii* Jaub. et Spach, Ill. Pl. Or. II (1844—46) 43), described from Kurdistan, differs in its unbranched shoots and leaves up to 6 cm long. Other characters indicated by Yu. Voronov are of no significance.

3. *N. minuta* Boiss. et Bal. Diagn. ser. II, 4 (1859) 76; Boiss. Fl. Or. IV, 966.

270

Annual, 3—20 cm high, glaucescent, pubescent; stem simple or in lower part short-branched, erect; leaves scabrous, subulate, broadly scarious-margined at base, arched-recurved, mucronate; bracts shorter, ovate-lanceolate, appressed; bracteoles ovate-lanceolate, navicular, carinate, scarcely surpassing the flowers, sparingly hairy at base; flowers solitary, forming compact spiciform inflorescences; perianth segments glabrous, bearing in fruit oval winglike mostly roseate outgrowths; appendages of anthers obtuse, barely one-fourth the length of anther.

Gravelly desert habitats. — Caucasus: S. Transc. (Erevan). Gen. distr.: Asia Minor. Described from a locality between Karagissar and Arapleu Kjoi in Cappadocia (SE Turkey). Type in Geneva.

Genus 427. **AELLENIA** * ULBRICH

Ulbrich in Engl. u. Prantl, Pflanzenf. 16 c (1934) 567.

Flowers perfect, solitary, subtended by broad herbaceous bracteoles; perianth of 5 segments, indurescent in fruit and developing winglike outgrowths, whereupon readily falling; stamens 5; anthers unappendaged, the very broad filaments dilated toward base; stigmas ovate, sessile; hypogynous disk fleshy; seeds horizontal, with spiral embryo; leaves alternate, broad, flat. The genus consists of 2 species.

1. *A. auricula* (Moq.) Ulbrich, l. c. — *Salsola auricula* Moq. Chenop. (1840) 135; Boiss. Fl. Or. IV, 958. — *S. moquiniana* Jaub. et Spach, Illustr. pl. or. II (1846) 52. — *Caroxylon auriculum* Moq. in DC. Prodr. XIII, 2 (1849) 173. — Ic.: Jaub. et Spach, l. c., tab. 137.

Undershrub, 30—100 cm high, profusely branched in the woody part; shoots long, mostly branching, pale, glabrous; leaves very broad, sometimes to 60 mm, ovate to suborbicular, entire, acute or subobtuse, sessile, strongly decurrent, coriaceous, glabrous, glaucescent, usually with slightly arched veins; flowers solitary, forming a paniculate inflorescence; bracts broad, often suborbicular, abruptly mucronate; bracteoles shorter than perianth; perianth segments ovate, glabrous, narrowly scarious-margined, indurescent and winged in fruit; wings rather large, yellowish, reniform, overlapping, gently reflexed; fruiting perianth including wings 15—20 mm across, readily falling in maturity; anthers divergent to above the middle; stigmas ovate, sessile or subsessile. August. (Plate XII, Figure 7).

Mottled strata. — Centr. Asia: Kara K. (Merv [Mary] District), Amu D., Pam.-Al. (W.). Gen. distr.: Iran. Described from a locality in Iran between the cities of Teheran and Isfahan. Type in Paris.

Genus 428. **RHAPHIDOPHYTON** ** ILJIN

Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. I, 3 (1936) et in Addenda V, p. 665.

Flowers perfect, 5-merous; perianth of 5 oblong segments; fruiting perianth with winglike outgrowths considerably below the middle; stamens 5; filaments united at base into a ring, alternating with the well developed semiorbicular lobes of the hypogynous disk; anthers with firm rather large appendages; ovary distinctly surpassing the vertical or horizontal seed which occupies the lower part of the fruit; embryo spiral. A monotypic genus.

1. *R. regelii* (Bge.) Iljin in Acta Inst. Bot. Ac. Sc. URSS, sér. 1, III (1936). — *Noaea regelii* Bge. in A. H. P. VI, 2 (1880) 440. — Ic.: Iljin, l. c.; Korovin, Rast. Sr. Az., fig. 48.

A small shrublet, 8—25 cm high, profusely branched at base; branches woody, covered with wartlike buds; annotinous shoots always purple-tinged in their middle part; stems mostly whitish in lower part; leaves alternate, rather closely approximate, mostly upright, stiff, obtusely 3-angled, acicular,

* Named for Paul Aellen of Basel, a renowned specialist in the genus *Chenopodium*.

** From the Greek words *raphis*, needle (alluding to leaf shape), and *phyton*, plant.

acuminate, spinescent, 2—4 cm long and ca. 1 mm broad, glabrous or, especially at margins, sharply scabrous, very slightly dilated at base; flowers subtended by and greatly exceeded by the bracts; bracteoles leaflike, much longer than flowers, dilated at base and embracing the perianth; perianth segments broadly lanceolate or oblong-ovate, purple, broadly scarious-margined, minutely mucronulate, convexly embracing the ovary below; fruiting perianth 5—7 mm long, all segments with rather narrow yellowish scarious wings considerably below the middle; anthers including appendage 3.5 mm long, sagittately split to the base; appendage lanceolate, acuminate, sessile, firm, to 1.5 mm long; stigmas 2, thickish, subulately pointed, in fruit as long as the style; ovary globular to ovaloid-globular, mostly with vertical ovule, in fruit greatly surpassing the free seed which assumes a horizontal position; seed naked, smooth, with thin scarious testa and slightly spirally coiled embryo. May—June. (Plate XIII, Figure 8 a, b).

Rocks and stony slopes; solitary. — Centr. Asia: T. Sh. (Kara-Tau). Endemic. Described from the vicinity of Kulachek in the Kara-Tau mountains. Type in Leningrad.

Genus 429. **HORANINOWIA*** FISCH. et MEY.

Fisch. et Mey. in Schrenk, Enum. pl. nov. 1 (1841) 10.

Flowers perfect, 5-merous, with herbaceous bracteoles; segments of fruiting perianth mostly cartilaginous, gibbous, mostly with stiffish wings, more rarely wingless; filaments of stamens united at base into a ring and alternating with sloping semiorbicular lobes of the hypogynous disk; ovary with 2 or 3 very short, barely perceptible and apparently capitate stigmas; fruit horizontal, slightly concave like the seed, vaulted below. Annual plants with stiff subulate spinescent leaves. The genus contains 4 species.

1. Upper leaves and branches alternate 2.
- + All leaves and branches opposite 3.
2. Stems glabrous; fruiting perianth stellate by the narrow wings 4. *H. excellens* Iljin.
- + Stems rough, densely papillose; fruiting perianth wingless or wings different from the above 1. *H. anomala* (C. A. M.) Moq.
3. Anthers terminating in a filiform appendage; segments of fruiting perianth not cartilaginous and not developing true wings; leaves as well as bracts and bracteoles of the capitate inflorescences somewhat recurved even when plant in fruit 2. *H. minor* Fisch. et May.
- + Anthers unappendaged; segments of fruiting perianth not cartilaginous, developing pronounced rather broad wings; leaves as well as the bracts and bracteoles of the spherical inflorescences always straight, spreading in various directions 3. *H. ulicina* Fisch. et Mey.

1. *H. anomala* (C. A. M.) Moq. in DC. Prodr. XIII, 2 (1849) 170. — *Salsola anomala* C. A. M. in Eichw. Plant. casp.-cauc. (1831—33) 14. — *Horaninowia juniperina* C. A. M. in Schrenk, Enum. 1 (1841) 11; Ldb. Fl. Ross. III, 2 (1851) 796. — Ic.: Eichw., l. c., t. XII. — Exs.: Sintenis, It. transcasp.-pers. no. 1288.

* Named for the botanist Pavel Goraninov of Minsk (1796—1866).

Annual, 10—30 cm high, glaucescent or yellowish, profusely branched; branches rather long, decumbent or ascending, opposite, approximate; stem and branches often with whitish bark in lower part, mostly densely covered like the leaves with short stiff papilliform hairs; leaves alternate except the lowest, subulate, stiffish, terminating in a slender spinule, sessile and very slightly dilated at base, with reduced branchlets in the axils; flowers axillary, solitary, forming strongly abbreviated compact often subcapitate inflorescences, borne from the very base of the stem; perianth segments membranous, ovate or oblong-ovate or oblong, obtuse or more rarely subacute, united only at base, in fruit cartilaginous and strongly gibbous, distinctly winged; wings colorless or smoky, semipellucid, often reduced to a narrow rim, sometimes none; anthers unappendaged; fruit ca. 1 mm in diameter, reversed-dome-shaped, with smooth naked thin scarious pericarp. July—August.

Sands, takyrs, argillaceous solonchak soils with sandy overburden. — Centr. Asia: Ar.-Casp., Kara K., Amu D., Kyz. K. (Amu Darya Delta). Gen. distr.: Iran. Described from the E. shore of the Caspian Sea (Krasnovodsk). Type in Leningrad.

Note. Plants from the Aral-Caspian region mostly differ from the glaucescent more southerly plants in their yellowish tint; no other distinguishing characters have so far been detected.

2. *H. minor* Fisch. et Mey. in Schrenk, Enum. I (1841) 10; Fenzl in Ldb. Fl. Ross. III, 2 (1851) 795; Kryl., Fl. Zap. Sib. IV, 946. — Exs.: Kar. et Kir. no. 1872 et 1889.

Annual, 5—30 cm high, branched from the base, with elongated prostrate lower branches, covered with very short stiff papilliform hairs; leaves subulate-filiform, all opposite, very slightly dilated and narrowly scarious-margined at base, terminating in a spine, somewhat recurved; bracteoles in compact axillary clusters, resembling the leaves but shorter and more dilated at base; flowers several together in the axils, forming capitate inflorescences; perianth segments oblong to oblong-ovate, membranous, obtuse, yellowish or smoky at apex; fruiting perianth not cartilaginous, the small outgrowth above the middle not winglike; anthers oblong, terminating in a filiform appendage; anthers ca. 1 mm in diameter, very slightly concave above, vaulted below, radially striated, glabrous, smooth. July—August. (Plate X, Figure 2 a, b).

Sands, mostly saline; also solonchaks. — Centr. Asia: Balkh. Gen. distr.: Dzu.-Kash. Described from the Lake Balkhash area (Ayaguz). Type in Leningrad.

Note. There is a single specimen from the vicinity of Kalai-Mor station in Turkmenistan, apparently adventive.

3. *H. ulicina* Fisch. et Mey. in Schrenk, Enum. pl. I (1841) 11; Fenzl in Ldb. Fl. Ross. III, 794; Kryl., Fl. Zap. Sib. IV, 946. — *H. juniperina* Bge. Reliq. Lehm. (1851) 468, non C. A. M. — Ic.: Fl. Yugo-Vost. IV (1930), fig. 282 (sub *H. minor*). — Exs.: HFR no. 987; Edit. Hort. Bot. P. M. no. 64; Kar. et Kir. no. 1890; HFR no. 2424 (sub *H. minor* var. *rigidior*).

Annual, 15—50 cm high, branched from the base, with rather long prostrate lower branches, covered throughout with very short stiff

papilliform hairs; leaves and branches all opposite, subulate, slightly dilated at base, mostly straight; flowers many together in the leaf axils, forming in fruit a spherical capitate inflorescence; bracteoles straight, projecting in all directions; segments of fruiting perianth cartilaginous, gibbous, winged above the middle; wings scarious, variously developed, with erose-toothed margin; anthers oval to oblong-oval, unappendaged; fruit ca. 1 mm in diameter, slightly concave above, dome-shaped below, radially striate, glabrous, smooth. June—August. (Plate X, Figure 1 a—d).

Sands. — Centr. Asia: Ar. -Casp., Balkh., Kyz. K., Kara K., Syr D., Amu D. Gen. distr.: Iran (?). Described from the E. shore of the Caspian Sea (apparently from Ogurchinskii Island). Type in Leningrad.

Economic importance. According to Agababyan, Granitov, and Kasimenko, the plant is readily eaten by camels throughout the year.

4. *H. excellens* Iljin in Journ. Bot. de l'URSS, 4 (1933) 276. — *Salsola excellens* Iljin, l. c.

Annual, 5—15 cm high, yellowish-green, bushy-branched from base, rather rigid; stems whitish, glabrous, leafy; leaves alternate, small, subtrigonus-terete, sessile, prickle-tipped, scarcely roughish or smooth, spreading; bracts with an axillary tuft of hairs, greatly surpassing the bracteoles, these very small, reniform, obtuse, shorter than the solitary flowers; perianth small, glabrous or faintly rough; segments ovate, scarious-margined, strongly incurved in fruit and winged at the middle; wings narrow, cuneate, with entire lateral margins and truncate incised-toothed summit, yellowish like the segments, rather faintly nerved, opaque, widely spaced, thus the fruiting perianth stellately 5-rayed, ca. 1.5 mm in diameter, together with wings 3—5 mm across, the lobes connivent, at first convex, subsequently strongly subsiding and forming together a 5-parted ridge with a depression at the center of the fruit; stamens not exerted; anthers small, subrotund or reniform, unappendaged, the slender filaments united at base into a ring and alternating with the semiorbicular lobes of the hypogynous disk. May—June. (Plate XII, Figure 2).

Sands. — Centr. Asia: Kyz. K. (Amu Darya Delta). Endemic. Described from the Karakalpak Kyzyl-Kum Desert, from the Mynbulak Depression to the south of Mynbulak. Type in Leningrad.

Genus 430. **SEIDLITZIA*** BGE.

Bge. in Boiss. Fl. Or. IV (1879) 950.

Flowers perfect, bracteolate, 1 to several closely together in the axils of opposite leaves; perianth segments 5, membranous, winged in fruit above the middle; wings semiorbicular or broadly obovate, more rarely narrower, united only at base; stamens 5; filaments united at base into a ring, alternating with semiorbicular not always well developed lobes of the hypogynous disk [staminodes]; anthers oval-oblong, unappendaged; ovary with 2 broad flat linear subsessile stigmas; fruit horizontal, with glabrous smooth pericarp; seed with spiral embryo, exalbuminous; leaves opposite, fleshy. The genus consists of 2 species.

* Named for N. K. Seidlitz, probably son of the famous Caucasian statesman (born 1831).

1. Annual plants 2. *S. florida* (M. B.) Boiss.
+ Shrubs 1. *S. rosmarinus* (Ehrh.) Bge.

1. *S. rosmarinus* (Ehrh.) Bge. in Boiss. Fl. Or. IV (1879) 951. — *Suaeda rosmarinus* Ehrh. Mss. ex Boiss., l. c. — Exs.: HFR no. 2784.

Shrub to 150 cm high, widely branching; stems to 4 cm thick, the grayish bark longitudinally fissured; branches glabrous, smooth, shining, milky-white, opposite; leaves fleshy, glabrous, obtuse, somewhat clavate, dilated at base, especially the upper ones, and distinctly gibbous in lower part; perianth segments oval or broader, commonly emarginate, winged in fruit; wings colorless or faintly roseate, smoky or brownish in drying, semipellucid; fruit 2—2.5 mm in diameter, gently concave at the top, convexly dome-shaped below, brown, whitish-margined. August—September.

Solonchaks, riverside "tugai," and solonchak depressions among sands. — Centr. Asia: Kara K. (SE), Amu D., Pam.-Al. Gen. distr.: Arabia, Iran. Described from Maksuk Island [?] in Arabia. Type in Berlin.

Economic importance. Used by local populations as a source of potash for soap making.

176 2. *S. florida* (M. B.) Boiss. Fl. Or. IV (1879) 951. — *Anabasis florida* M. B. Fl. taur.-cauc. I (1808) 190. — *Salsola florida* Poir. Encycl. Suppl. V (1817) 191. — *S. pulla* C. Koch in Linnaea XXII (1849) 190. — *Anabasis cinerea* Moq. in DC. Prodr. XIII, 2 (1849) 214. — *Chenopodina picnantha* C. Koch in Boiss., l. c., p. 951. — *Haloxylon floridum* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 819. — Ic.: M. B. Ic. Cent. pl. rar. Ross. tab. 17; Engl. u. Prantl, Pflanznf. 16c, 2 Aufl. (1934), f. 40 Q et R.

Annual, 10—50 cm high, glabrous, divaricately branched from base, with whitish stem and opposite branches; leaves glaucous, glabrous, fleshy, obtuse, terete, the lower mostly subarcuately recurved, the upper dilated at base, approximate, with a tuft of hairs and a solitary flower in the axils; perianth segments oblong-oval, mostly 2-lobed at the summit, winged in fruit; wings rosy-red, rounded-obovate, narrowing toward base; fruit 1.75—2 mm in diameter, concave at the top, slopingly dome-shaped below. July—August.

Dry puffy solonchaks. — Caucasus: E. and S. Transc. Gen. distr.: Arm.-Kurd., Iran. Described from the Kura River valley in Armenia. Type in Leningrad.

Economic importance. Used like the preceding species. Also considered as good fattening feed for sheep.

Genus 431. **OFAISTON*** RAFIN.

Rafin. Fl. Tellur. III (1836) 46.

Flowers perfect; perianth segments 3—5, the three outer with rudimentary wings on the back; stamen 1, more rarely 2; anthers with a small appendage; ovary vertical, glabrous, with a short style and 2 subulate

* The meaning of the name is unknown. According to J. Murr. (Asch. u. Gr. Syn. V, 1913, 213), derived in Pliny's writings from the Greek word hippoveston, signifying fuller's burr (spina fullonia).

stigmas; flowers subtended by a pair of carinate bracteoles, forming a narrow spiciform inflorescence; embryo spiral. Annual plants with alternate leaves. A monotypic genus.

1. *O. monandrum* (Pall.) Moq. in DC. Prodr. XIII, 2 (1849) 203; Shmal'g., Fl. II, 383; Kryl., Fl. Zap. Sib. IV, 956; Il'in in Fl. Yugo-Vost. IV, 224. — *Salsola monandra* Pall. It. III (1776) 607, 635, 724. — *S. dichotoma* Pall., l. c., p. 604, 635, 637. — *Anabasis monandra* Schrad. Neues jour. III (1809) 89. — *Halocnemum monandrum* Georgi, Besch. Russ. Reich. III, 4 (1800) 664. — *Halogeton monandrus* C. A. M. in Ldb. Fl. Alt. I (1829) 379. — *Ofaiston pauciflorum* Rafin., l. c. (1836) 46; Fenzl in Ldb. Fl. Ross. III, 837. — Ic.: Pall. Illustr. t. 31; Fl. Yugo-Vost. IV, 224, fig. 287. — Exs.: HFR no. 786.

277 Annual, 5–40 cm high, glaucous, mostly branched; stem erect or ascending like the lower branches, covered like the leaves with appressed asymmetrically 2-tipped hairs, subsequently glabrescent; leaves alternate except the lowermost, these long, linear-terete, fleshy, obtuse, half-clasping at base, usually deciduous when plant in fruit; all other leaves short, scalelike, ovate, shorter than fruiting perianth and bracteoles; flowers remote in a slender spiciform inflorescence, enveloped on two sides by bracteoles, these navicular and tubercled in lower part; perianth segments 3–5, distinct, acute, narrowing toward base, the three outer broader and with a rudimentary winglike dorsal protuberance in fruit, the two inner, when present, narrowed and without protuberance; fruit ovaloid or oblong-ovaloid, 2–3 mm long and 1–1.5 mm broad, with succulent fleshy pericarp; seed at the base of fruit, ca. 1 mm long. July–September. (Plate XIV, Figure 1 a–d).

Wet solonchaks. — European part: Transv., L. V.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from the shores of Lake El'ton. Type in London.

Genus 432. **GIRGENSOHNIA*** BGE.

Bge. Rel. Lehm. (1851) 302; Fenzl in Ldb. Fl. Ross. III, 2 (1851) 835.

Flowers perfect, bracteolate, 5-merous; perianth distinct nearly to the base, 2 or 3 of them with winglike protuberance in fruit; stamens 5, inserted on a fleshy lobed hypogynous disk; anthers with narrow sublinear appendages; ovary with a short style and 2 stigmas; fruit vertical; seeds with spiral embryo, the radicle pointing upward. Annuals or undershrubs with stiff opposite leaves. The genus contains 6 species.

1. Stem and leaves glabrous, glaucous; perianth always with 2 wings 3. *G. diptera* Bge.
- + Stem and leaves roughened by very short papillae; perianth wingless or 3-winged 2.
2. Yellowish-green plants with slender branches imparting spherical shape; bracts and bracteoles strongly arched-recurved; fruiting perianth wingless. Kara-Kum Desert 2. *G. minima* Eug. Kor.

* Named for the investigator of peat bogs, G. K. Girgensohn.

+ Glaucous plants, often reddish-tinged; bracteoles terminating in a rather straight prickles; fruiting perianth always winged
. 1. *G. oppositiflora* (Pall.) Fenzl.

1. *G. oppositiflora* (Pall.) Fenzl in Ldb. Fl. Ross. III, 2 (1851) 835; Kryl., Fl. Zap. Sib. IV, 957; Il'in in Fl. Yugo-Vost. IV, 226. — *G. pallasii* Bge. Rel. Lehm. (1851) 303. — *G. heteroptera* Bge., l. c. — *G. gypso-philoides* Bge., l. c. — *Noaea oppositiflora* Moq. in DC. Prodr. XIII, 2 (1849) 31. — *Hologeton oppositiflorus* C. A. M. in Ldb. Fl. Alt. I (1829) 378. — *Salsola oppositiflora* Pall. It. II app. (1773) 735; Illustr. (1803) 35. — *Anabasis oppositiflora* M. B. Mém. Soc. nat. Mosc. I (1806) 148. — *A. heteroptera* Jaub. et Spach., Ill. pl. or. II (1844/46) 45. — *Chenopodium oppositifolium* Willd. Sp. pl. I (1797) 1307. — Ic.: Pall. It., l. c., t. O; Illustr. t. 27 (sub *Salsola*); Jaub. et Spach., l. c., t. 134; Fl. Yugo-Vost. IV, 226, fig. 228. — Exs.: HFR no. 29.

Annual, 10—50 cm high, stiffish; often reddish; stem and leaf roughened by short prickles, the lower part of the stem often whitish; leaves subulate to subtrigonal-subulate, mostly subarcuate, terminating in a short slender spinule, dilated at the broadly scarious base, especially the upper, the margin commonly ciliate; flowers all over the plant in the axils of leaflike bracts but mostly on short branchlets, in remote opposite spiciform inflorescences; bracteoles naviculate, shorter than perianth; perianth segments membranous, ovate or oblong, distinct nearly to base, the 3 outer bearing in fruit subrotund mostly reddish wings, of these the two lateral horizontally spreading, the posterior erect and appressed to stem, the two inner segments wingless; appendage of anther subulate to conical-subulate, white, one-fourth to one-half the length of the anther; ovary covered on the top with short capitate hairs; stigmas 2, very short; fruit strongly compressed, with glabrous smooth olivaceous-brown pericarp; seeds oval or oblong-oval, 1—2 mm long and 0.8—1.5 mm broad. June—August. (Plate XIV, Figure 2).

Deserts; growing in groups on solonchaks and on solonchak, clayey, gravelly, or often sandy loam soils. — Centr. Asia: throughout, but mainly in the plains. Gen. distr.: Iran., Dzu.-Kash. Described from the steppes along the lower reaches of the Ural River. Type in London.

Economic importance. According to Agababian, Granitov, and Kasimenko, eaten readily by camels and sheep all the year round.

2. *G. minima* Eug. Kor. in Not. Syst. Herb. Hort. Bot. Petrop. V, 11—12 (1924) 2.

Annual, 15—30 cm high, divaricately much branched from the base, spherical-bushy, yellowish-green, with slender branches, rough throughout with short stiff papillae; leaves subulate, arched-recurved, terminating in a slender spinule, dilated and white-hyaline-margined at base; bracts surpassing flowers; bracteoles navicular, rough-papillose, obtusely carinate, prickles-tipped, equaling or very slightly surpassing the flowers, in fruit distinctly shorter; flowers small, solitary or in pairs; perianth segments acute or acuminate, the three outer ovate, the two inner lanceolate, apparently none winged in fruit; stamens shorter than perianth; anthers with a linear appendage; stigmas very short; fruit oblong, forming a conical body above the seed; seed oval, 1—1.5 mm long. May—June.



PLATE XIV. 1. *Ofaiston monandrum* (Pall.) Moq.: a) branch, b) stamen, c) scale, d) perianth.— 2. *Girgensohnia oppositiflora* (Pall.) Fenzl: fragment with flowers.— 3. *Nanophyton erinaceum* (Pall.) Bge.: a) vegetative branch, b) fruiting branch, c) flower, d) stamen.— 4. *Piptoptera turkestanica* Bge.: a) dorsal view of fruiting perianth, b) a perianth segment with wing fallen.— 5. *Cornulaca korshinskyi* Litw.: a) branch, b) fruit.— 6. *Halogeton glomeratus* C.A.M.: a) branch, b) stamen.— 7. *Halocharis hispida* C.A.M.: a) branch, b) inflorescences.— 8. *Sympegma regelii* Bge.: a) branch, b) inflorescences.

Saline hollows in sands. — Centr. Asia: Kara K. Endemic. Described from near the village of Bala-Ishem. Type in Tashkent; cotype in Leningrad.

Note. No wings have been observed on any of the specimens investigated, not even on fall plants collected in September which had fully mature fruits. It may be assumed that properly developed wings are altogether absent in this species.

3. *G. diptera* Bge. Reliq. Lehm. (1851) 303; *Anabas. rev.* (1862) 33.

Annual, 10—40 cm high, glaucous, branched from the base, glabrous; branches almost 4-angled; leaves on lower part of the stem subulate, dilated and hyaline-margined at base, prickle-tipped; those on upper part of the stem and on flowering branches closely approximate, broad-ovate, acute, subappressed, mostly subtending a solitary flower; bracteoles navicular, carinate, smooth, somewhat shorter than flower; two anterior perianth segments broad-ovate, 1-nerved, with well developed wing considerably above the middle, the two narrow nerveless lateral segments and the broader posterior one wingless; anthers with a very small slightly elongated appendage; stigmas 2, very short; fruit ovaloid, glabrous, 1.5—1.75 mm long, very slightly surpassing the seed. May—June.

Desert plant communities on saline, gravelly, and pebbly soils. — Centr. Asia: Syr D., Pam.-Al. (Samarkand). Endemic. Described from the vicinity of Samarkand. Type in Leningrad.

Genus 433. **ANABASIS*** L.

L. Sp. pl. (1753) 223; Gen. pl. ed. 5 (1754) 1104.

Flowers perfect, 5-merous; bracteoles shorter than flowers; perianth segments membranous, obtuse, the posterior and two anterior ones broader, the other two narrower, mostly at least three of the segments winged, more rarely wingless; stamens 5, unappendaged, the filaments united into a hypogynous disk and alternating with semiorbicular or oblong staminodal lobes; ovary with 2 or 3 short thick stigmas; fruit berrylike; seed vertical, with spiral embryo. Plants with jointed stems and reduced or obsolete opposite leaves; mostly undershrubs or perennials. The genus contains about 30 species. Russian: ezhovnik.

1. Fruiting perianth wingless (Section 3. *Brachylepis* Schrenk) . . . 2.
- + Fruiting perianth winged 4.
2. Green shoots inserted on a firm woody mostly multicapital caudex arising from a taproot; a bluish-glaucous plant; middle leaves oblong to oblong-ovate, semiterete, bristle-tipped, recurved 9. *A. eriopoda* (Schrenk) Benth.
- + Green shoots inserted on normal woody branched twigs 3.
3. Plants 5—25 cm high, with reduced woody twigs in lower part; leaves 2—5 mm long (lower and middle), arched-recurved 7. *A. salsa* (C. A. M.) Benth.
- + Plants 20—50 cm high, with long woody twigs; leaves rudimentary, 1—2 mm long, mostly appressed to stem, more rarely spreading or almost scalelike 8. *A. ramosissima* Minkw.

* From Greek *anabasis*, ascent, first occurring in Pliny's writings.

4. Wings erect, firmly adhering to fruit, greatly surpassing the perianth and about as long as or shorter than the fruit 5.
- + Wings spreading or erect but not firmly enveloping and longer than the fruit 6.
5. Stem prominently 4-angled; leaves with a yellowish or reddish membranous periphery and a narrow colorless scarious margin, always glumaceous-pointed 11. *A. turkestanica* Eug. Kor. et Iljin.
- + Stem terete; leaves in upper part of stem rounded at apex, not pointed; wings developing in late fall. 10. *A. ferganensis* Drob.
6. Leaves always developed, terete, never scalelike; ovary and fruit with granulose apparently glandular pericarp (Section 2. *Adenophora* Iljin.) 7.
- + Leaves variously shaped; ovary and fruit smooth, not glandular (Section 4. *Euanabasis* Bge.) 12.
7. Annual plants 1. *A. micradena* Iljin.
- + Perennial plants 8.
8. Plants rough with papillae, these sometimes discernible only with a magnifier 9.
- + Plants quite smooth, not papillose 10.
9. Plants distinctly and densely papillose on the green stems and leaves, forming a true caudex covered with white hairs. Alai and Tien Shan 2. *A. pelliottii* P. Danguy.
- + Plants obsoletely papillose, forming a very small undershrub, the woody part consisting of very short closely approximate lignified twigs. Zaisan 4. *A. affinis* Fisch. et Mey.
10. Stems yellowish-green, 4-angled, arising from a proper caudex. Near the Ulu-Tau Mountains. 3. *A. turgaica* Iljin et Krasch.
- + Stems glaucescent-green, terete 11.
11. Leaves 3—5 mm long, terminating in a slender straight or recurved bristle. Chuya Steppe in Altai and the Dzungarian Ala-Tau 6. *A. brevifolia* C. A. M.
- + Leaves 5—8 mm long, terminating in thickish arched-incurved bristle. Naryn River in Tien Shan 5. *A. abolini* Iljin.
12. Plants covered with minute papilliform hairs 23. *A. hispidula* (Bge.) Benth.
- + Plants glabrous and smooth 13.
13. Stems sometimes unbranched 14.
- + Stems branched 15.
14. Only three perianth segments winged 13. *A. cretacea* Pall.
- + All five perianth segments winged 14. *A. macroptera* Moq.
15. Leaves rudimentary, scalelike, obtuse or acute, without a terminal cusp or bristle 16.
- + Leaves always terminating in a bristle or cusp 19.
16. Low plants, 5—15 cm in height; green stems inserted on a woody caudex arising from a taproot; branches short, mostly arched-recurved; all five perianth segments winged 15. *A. truncata* (Schrenk) Bge.
- + Taller undershrubs, normally branched; green shoots inserted on woody twigs and on the short stem 17.

17. Leaf rudiments obtuse; flowers gathered at the ends of branches into distinct spiciform inflorescences; only three perianth segments winged, the others wingless or with a rudimentary wing 16. *A. aphylla* L.
- + Leaf structures mostly acute; flowers scattered, not arranged in distinct spiciform inflorescences; all perianth segments winged . . . 18.
18. Perianth segments small, even in fruit not more than 2 mm long, the curved wings upturned 17. *A. balchaschensis* Iljin.
- + Perianth segments larger, flat; wings subhorizontally spreading 18. *A. pauciflora* M. Pop.
19. Stems distinctly 4-angled 20.
- + Stems terete or in upper part obscurely and obtusely 4-angled 21.
20. Yellowish-green plants with branches curved candelabra-like; green stems inserted on a caudex and minutely puncticulate (magnifier!) 12. *A. brachiata* Fisch. et Mey.
- + Green plants, with obliquely ascending branches; green stems branching out in the lower woody part of the plant; bark not punctured 19. *A. gypsicola* Iljin.
21. Green stems inserted on a capitate woody caudex; flowers not forming a distinct inflorescence 22. *A. jaxartica* (Bge.) Benth.
- + Green stems arising in the profusely branched lower part of the undershrub; flowers forming a spiciform inflorescence 22.
22. Green plants; leaves scalelike, triquetrous-subulate, appressed to the stem, terminating in a colorless bristle 20. *A. elatior* (C. A. M.) Schischk.
- + Glaucous plants; leaves subulate, semiterete, spreading, terminating in a caducous bristle 21. *A. korovini* Iljin.

Section 1. SETIFERA Ulbrich in Engl. u. Prantl, Pflanzenf. 16c. 2 Aufl. (1934) 576. — Section *Polyanthos* Eug. Kor. in Bull. Univ. As. Med. f. 20, no. 4 (1935) 189 (pp.). — Leaves well developed, terminating in a strong bristle; stem internodes with 4 conspicuous longitudinal furrows; flowers numerous, axillary; ovary glandular.

1. *A. micradena* Iljin sp. nova in Addenda V, p. 666. — *A. annua* auct. turkest., non Bge.

Annual, yellowish-green, 5—20 cm high, glabrous, hemispherical, without a main stem, giving rise from the base to 3 or 4 equally developed ascending branches; leaves fleshy, half-clasping, strongly convex beneath, slightly concave above, somewhat thickened at apex, often terminating in a caducous [?] bristle ca. 2—5 mm long, the middle semiterete, linear-oblong, 6—10 mm long, slightly recurved, the lowermost oblong, rounded at apex, muticous, flat, soon deciduous, 10—15 mm long; flowers numerous, in groups of 3—7; bracteoles small, of two kinds, the outer herbaceous-keeled, scarious-margined, obtuse, concave, the inner spatulate, scarious, interspersed with axillary hairs; perianth segments oblong to oblong-oval, membranous, almost nerveless, winged in fruit near the summit; wings thin, membranous, yellow or yellowish, semipellucid, erect, closely contiguous, on three segments rounded-reniform, on two others broadly obovate; ovary densely

papillose; fruit oval, compressed laterally, purple or orange, with light-colored glandlike papillae, 1—1.5 mm long. August.

Takyr, gravelly buttes among sands — Centr. Asia: Kyz. K., Kara K., Amu D. Endemic. Described from localities lying between the Sultan-Uiz-Dag Mountains and Kyz-ayaz in the Karakalpak ASSR. Type in Leningrad.

Section 2. *ADENOPHORA* Iljin in Ulbrich *Chenop.* in Engl. u. Prantl, *Pflanzenf.* 16c. 2 Aufl. (1934) 576. — Section *Polyanthos* Eug. Kor. in *Bull. Univ. As. Med.*, f. 20, no. 4 (1935) 189 (pp.). — Leaves well developed, setulose; internodes obscurely furrowed; flowers many in the axils; ovary glandular.

2. *A. pelliottii* P. Danguy ex H. Lecomte, *Not. Syst.* II, 6 (1912) 164; O. et B. Fedtsch. *Consp. Fl. turk.* VI, 251. — *A. transchellii* Litw. in *Herb. Inst. Bot. Acad. Sc. URSS*.

Undershrub 5—15 cm high, yellowish-green, rough with small papillae; root long and stout; caudex tomentose at stem base; stems numerous, erect, tetragonous-terete, furrowed when dry, brittle, with 5—8 internodes; leaves semiterete, slightly channeled above, usually somewhat clavately thickened at apex and terminating in a short bristle, very slightly arched-recurved, 6—12 mm long and 1—2 mm broad, with a dense tuft of hairs in the axils; flowers in 3's in the axils; bracteoles about as long as flowers, perianth segments ca. 2.5 mm long, oval, obtusish, developing in fruit merely rudiments of wings; filaments of stamens united with the hypogynous disk and forming a ring with the staminodal lobes; ovary verrucose; stigmas short-subulate, borne on a very short style, dark, recurved. July. (Plate XV, Figure 10).

Gravelly slopes. — Centr. Asia: Pam.-Al., T. Sh. (Toguz-Toraus). Gen. distr.: Kashgaria. Described from the Alai Valley. Type in Paris.

Note. Here belongs the plant described by E. Korovin for the Toguz-Toraus district of central Tien Shan, *A. narynensis* Eug. Kor. (*Bull. Univ. As. Med.*, 20, 4 (1935), 189).

286 3. *A. turgaica* Iljin et Krasch. in *Mat. Komiss. eksp. issl. Akad. Nauk*, no. 26 (1930) 284. — *A. pavlovi* Eug. Kor. in *Pavlov, Kompleksn. pust. Korsakpaya*, (1931) 87. — Ic.: *Acta Univ. As. Med. Ser. VIII-B*, 22, p. 29.

Undershrub, 5—15 cm high, yellowish-green, with elongated root and caudex; stems numerous, with 3—7 internodes, glabrous, smooth, mostly branched, in lower part 4-angled, with short spreading twigs consisting of 1 or 2 internodes; basal leaves 1—3, scalelike, semiorbicular; lower cauline oblong-ovate, the others oblong, 5—10 mm long, terete, arched-recurved, slightly channeled above, obtuse, terminating in a short caducous bristle, with a tuft of short hairs in the axils; flowers in 3's, subglobular, with small bracteoles; perianth segments oval to suborbicular, subpellucid, obtuse, entire or sometimes irregularly and sparingly toothed, overlapping; stamens with very short filaments, the anthers with locules free up to the middle, terminating in a minute obsolescent appendage; stigmas subulate; fruit berrylike (?). July—August.

Stony slopes. — Centr. Asia: Ar.-Casp. (Ulu-Tau Mountains). Endemic. Described from two specimens, from near the settlement of Ak-bulak and Mai-Tyube Mountains. Type in Leningrad.

4. *A. affinis* Fisch. et Mey. in Schrenk, Enum. pl. nov. soong. I (1841) 10; Fenzl in Ldb. Fl. Ross. III, 826. — *A. brevifolia* Bge. (non C. A. M.) Anab. rev. (1862) 42 (p. p.); Kryl., Fl. Zap. Sib. IV, 962 (p. p.).

Undershrub, 5—15 cm high, pale green or glaucescent, scarcely roughened; root stout, with grayish-black bark; branches apparently forking, closely approximate (the character of branching is masked in the case of very short branches), giving rise to numerous short terete few-jointed simple or slightly branched stems of the current year; leaves linear, semiterete, fleshy, somewhat flattened above, the middle 7—12 mm long, mostly somewhat thickened at apex and terminating in a short colorless prickle, the lowermost scalelike; flowers 1—6 in the axils, with small scarious-margined bracteoles; perianth segments membranous, obtuse, winged in fruit at or just above the middle; wings on all 5 segments orbicular or broadly obovate, reddish (always?); staminodal lobes short, semiobicular, thickish; fruit compressed, ca. 2—2.5 mm in diameter, almost round, reddish (always?), covered with little transparent warts. July—August.

Gravelly slopes. — Centr. Asia: Balkh. (Zaisan Mountains). Gen. distr.: Dzu.-Kash. Described from Dzungaria, not far from the Irtysh River. Type in Leningrad.

287 5. *A. abolini* Iljin sp. nova in Addenda V, p. 666.

Undershrub, 10—25 cm high, with rather stout root, the woody part intricately branched with closely approximate short and mostly repeatedly forking branches; shoots of the preceding year glaucescent, simple, subterete, 1.5—2 mm thick, smooth; leaves thickish, subterete, slightly clavate, obtuse, 5—8 mm long, terminating in a thickish arched-upcurved bristle 1—2 mm long, spreading, almost straight; outer bracteoles navicular, herbaceous, subobtuse, narrowly scarious-margined, the inner much smaller, scarious and subpellucid; flowers mostly 3 in the axils; perianth segments ovate or oval, obtuse, in fruit with winglike outgrowths; filaments of stamens very short, subulate, hence anthers apparently sessile; staminodal lobes at anthesis somewhat shorter than ovary, glandular-fimbriate, the glands borne on multicellular stalks; ovary covered with small scattered glands. July—August.

Outcrops of Tertiary clay. — Centr. Asia: T. Sh. (Naryn River valley). Endemic. Described from the Ketmen-Tyube District [Toktogul District] around the Takhtalyk natural boundary area. Type in Leningrad.

6. *A. brevifolia* C. A. M. in Ldb. Fl. Alt. I (1829) 377; Fenzl in Ldb. Fl. Ross. III, 823; Bge. Anabas. rev., 42 (p. p.); Kryl., Fl. Zap. Sib., IV, 962 (p. p.). — Ic.: Ldb. Ic. pl. Fl. Ross. I, t. 39.

Undershrub 5—10 (15) cm high, glabrous, densely tufted; stems of the current year numerous, crowded, subterete, brittle, simple or branched, light green; leaves fleshy, flattish above, convex beneath, terminating in a deciduous prickle or a short bristle, the middle oblong, 3—5 mm long,

spreading and mostly very slightly recurved, the basal scalelike, ovate, appressed to stem; all leaves with hairs in the axils; flowers usually solitary in the axils, with ovate concave obtuse scarious-margined bracteoles; perianth segments ovate, obtuse, winged in fruit at the summit; wings scarious, rounded-reniform, yellowish or reddish-orange, erect; staminodal lobes scarcely glandular; fruit ovate, almost dry, ca. 2.5 mm long, with granulose pericarp. June—July. (Plate XV, Figures 8 and 9).

Gravelly and argillaceous solonetz slopes; taluses. — W. Siberia: Alt. (Chuya), Dzu.-Tarb. (Dzungarian Ala Tau). Gen. distr.: Mong., Tib., China (Kansu). Described from the Chuya River valley in Altai. Type in Leningrad.

288 Section 3. *BRACHYLEPIS* (C. A. M.) Bge. *Anabas.* rev. (1862) 47. — *Brachylepis* C. A. M. in Ldb. *Fl. Alt. I* (1829) 370 as genus. — Section *Monanthos* Eug. Kor. in *Bull. Univ. As. Med.* f. 20, no. 4 (1935) 189 (p. p.). — Perianth segments wingless; fruit smooth, always surpassing the perianth.

7. *A. salsa* (C. A. M.) Benth. in Benth. et Hook. *Gen. pl.* III (1880) 73; Kryl., *Fl. Zap. Sib.* IV, 963; Il'in in *Fl. Yugo-Vost.* IV, 227. — *Brachylepis salsa* C. A. M. in Ldb. *Fl. Alt. I* (1829) 372; Fenzl in Ldb. *Fl. Ross.* III, 827; Shmal'g., *Fl. II*, 384. — *B. humilis* Less. in *Linnaea* IX (1834) 198. — *Microlepis salsa* Eichw. *Pl. casp.-cauc.* (1831) 2. — *A. tatarica* var. β Pall. *Illustr.* (1803) 13. — *Anabasis brachylepis* D. Dietr. *Syn. pl.* II (1840) 995. — Ic.: Ldb. *Ic. pl. Fl. Ross.* I, t. 48; *Acta Univ. As. Med.* ser. VIII B 21, fig. 5. — Exs.: HFR no. 2785. — Vernacular name: (b'yurgen).

Undershrub, mostly 5—25 cm high, with woody profusely ramified branches in lower part; annotinous shoots numerous, pale green or glaucescent or intensely glaucous (var. *glauca* Kar. et Kir. in *Bull. Soc. Nat. Mosc.* (1841) 731), terete, 1—2 mm in diameter at base, glabrous, always rather strongly branched; internodes either elongated (up to 40 mm) or much reduced (to 2—3 mm); leaves fleshy, the lower and middle 2—5 mm long, semiterete, in lower half mostly very slightly dilated, obtusish, often terminating in a very short caducous bristle, commonly arched-recurved, the upper obsolescent; bracts broad, scalelike, ovate-trigonous, obtusish; flowers solitary, forming a spiciform inflorescence; bracteoles lateral, broad-ovate, herbaceous, obtuse, much shorter than flowers; perianth segments membranous, obtuse, unchanged in fruit; filaments of stamens alternating with ovate fleshy glandular-ciliate staminodal lobes; fruit broad-ovate, succulent, red, containing blood-red juice, always slightly exserted. July—August.

Solonchaks gravitating to solonetz, desert plant communities on gravelly solonetzic soil, wormwood-solonchak deserts, takyrs, and puffy solonchaks; growing in massive stands. — European part: L. V.; Caucasus: E. Transc. (Baku); W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D. Gen. distr.: Dzu.-Kash. Described from three locations in present-day Kazakhstan: 1) western part, 2) Zaisan, and 3) shores of the Caspian Sea. Type in Leningrad.

Note. An exceedingly polymorphic species, varying in the length of leaves and internodes, as well as in the succulence and color of stems. Thus E. Korovin separated the species *A. depressa* Eug. Kor. (in N. V. Pavlov, *Kompleksn. pust. Karsakpaya* 1931, 117 et *Bull. Univ. As. Med.*, 20, 4 (1935), 189) which, in our opinion, is merely a form of *A. salsa*. As regards *A. ramosissima* Minkv., this is also but a recent race of the same species, connected with it by numerous transitions and included within its distribution area (even though confined to its southern part) and differing only in quantitative characters.

Economic importance. The plant is of great importance as food for camels. It covers extensive areas and provides fattening forages for these animals in fall and winter. It is eaten readily in spring but reluctantly in summer. Horses, sheep, and goats are not much attracted to it. According to local reports, the plant, when eaten by horses, causes falling of mane and tail hairs and sometimes shedding of hoofs. The grazing value is estimated at 160–300 kg per hectare. Analysis of plants from West Kazakhstan ([former] Adai County) before flowering gave the following percentage composition for air-dry weight: hygroscopic water 5.88, ash 29.69–31.55, cellulose 10.98–11.67, crude protein 11.24–11.94, pure albumin 6.18–6.44, amides 0.16–0.17, crude fat 1.82–1.93, nitrogen-free extract 40.39–42.91, soluble carbohydrates 1.08–1.15 before and 1.15–1.20 after inversion, starch equivalent 30.12–32.01. The results for flowering plants (2 analyses) were: hygroscopic water 5.67–5.30; ash 31.19–33.06, 30.08–31.85; cellulose 12.07–12.80, 13.57–14.34, crude protein 8.96–9.50, 10.12–10.69; crude fat 1.39–1.47, 2.15–2.27; nitrogen-free extract 40.72–43.17, 38.78–40.85; starch equivalent 28.93–30.95, 28.98–30.49. Four analyses of fruiting plants — (1) from the Mugodzhary Hills, (2) and (3) from Adai County, and (4) from the Mangyshlak Peninsula — gave the following results: hygroscopic water: 5.90–5.30, 4.48–7.99; ash 21.34–22.67, 28.57–30.17, 28.06–30.00, 24.93–27.09; cellulose 15.35–16.35, 12.86–13.58, 11.70–12.25, 11.47–12.47; crude protein 9.54–10.13, 9.58–10.12, 8.53–8.93, 13.11–14.25; pure albumin (only from the fourth sample) 8.92–9.75; crude fat 2.67–2.83, 2.04–2.15, 2.24–2.35, 1.61–1.75; nitrogen-free extract 45.20–48.02, 41.65–43.98, 44.99–46.47, 40.89–44.44; soluble carbohydrates (only from fourth sample) 0.74–0.81 before, and 0.80–0.87 after inversion; starch equivalent 33.06–35.11, 30.44–32.23, 31.91–33.40, 31.03–33.80 (I. Larin). No alkaloids have been detected in this species. Fruit-bearing plants from West Kazakhstan had the following percentage composition: ash 19.05, hygroscopic water 5.53, K 0.94, Na 2.34, Cl 0.83, P₂O₅ 0.15, S 0.08, SiO₂ 2.06, Fe 0.20, CaO 5.95, MgO 1.41. The soluble salt content, computed for sodium, may amount in this plant to 1.36%, while Glauber's salt is absent. The percentage composition of the ash was found to be: SiO₂ 10.82, Fe 1.04, CaO 31.22, MgO 7.36, S 0.42, K 4.93, Na 12.30 (I. Larin).

8. *A. ramosissima* Minkw. in *Bull. Jard. Bot.* XIV, 3 (1914) 232 et in O. et B. Fedtsch. *Consp. Fl. Turk.* VI (1916) 254. — *Brachylepis ramosissima* Ulbrich in *Engl. u. Prantl, Pflanzenf.* 16c, 2 Aufl. (1934) 577. — Exs.: HFR no. 3087.

Undershrub, 20—50 cm high; branches in the lower part of the plant profusely ramified, rather long, woody, often transversely fissured, giving rise to numerous annual shoots, these glaucescent, glabrous, ca. 2.5—3 mm in diameter at base, terete in lower part, obtusely 4-angled in upper part, consisting of 12—20 internodes; leaves rather undeveloped, the lower and middle mostly not more than 2 mm long, thickish, semiterete, sometimes with a very short caducous bristle, the others or almost all scalelike, appressed obtusish; flowers solitary or in pairs, forming a spiciform inflorescence; bracteoles lateral, rounded-ovate, scarious-margined, shorter than flowers; perianth segments scarious, obtuse, little changed in fruit, wingless, three rounded-oval and two oblong; filaments of stamens alternating with semiorbicular staminodal lobes; fruit broad-ovate, reddish-purple, succulent, with blood-red juice, slightly exserted. July—August.

Gypsiferous clays, takyrs, chalks, and solonchak deserts. Covers extensive areas, often forming pure stands. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D. Endemic. Described from numerous specimens, the first being from Saksaul'skaya station, and this one may be considered as the type. Type in Leningrad.

Note. See note to *A. salsa* (C. A. M.) Benth.

9. *A. eriopoda* (Schrenk) Benth. in Benth. et Hook. Gen. pl. III (1883) 73. — *Brachylepis eriopoda* Schrenk in Bull. phys.-math. Acad. Sc. Petersb. I (1843) 360; Fenzl in Ldb. Fl. Ross., III, 827; Boiss. Fl. Or. IV, 971; Bge. Anab. rev., 49. — Ic.: Acta Univ. As. Med. ser. VIII B, 21, fig. 3. — Exs.: HFR no. 1889b.

Undershrub, 10—30 cm high, glaucous, almost bluish, glabrous, usually hemispherical; root straight, cylindric, long, blackish, ca. 1—2 cm in diameter; caudex woody, capitate, woolly-tomentose at the base of stems; stems very numerous, 2—5 mm in diameter at the subterete base, in upper part obtusely 4-angled like the branches, wrinkled on drying, profusely divaricately branched from the lower third, consisting of 10—15 internodes woolly-tufted at base, the lowest elongated; leaves at base of stem scalelike, the lower oblong-ovate, to 6—10 mm long, the middle oblong-ovate to lanceolate and 2—5 mm long; all leaves terminating in a colorless bristle 2—5 mm long, arched-recurved to pendulous, only the uppermost ascending; flowers solitary in axils; bracteoles lateral, herbaceous, obtusely keeled, prickly, shorter than the flowers; perianth segments scarious, obtuse, oval or the inner oblong, obsoletely and irregularly toothed at apex, unchanged in fruit; staminodal lobes broad, ciliate; stigmas subulate, short, thickish; fruit broad-ovoid to globular, 3—5 (6) mm long, berrylike, yellow or orange (drying black), greatly surpassing the perianth. June—August. (Plate XV, Figure 1).

Mostly takyrs; also chalks, solonchak *Haloxylon* communities, especially sandy-clay and gravelly-solonchak deserts with wormwood-dominated communities. — Centr. Asia: Ar.-Casp., Balkh., Kara K. (Dzhebel), Kyz. K. Amu D., T. Sh. (very rarely: Issyk-kul'). Gen. distr.: Iran? Described from the Chu River. Type in Leningrad.

Economic importance. Eaten only by camels, rather reluctantly and mostly in fall and winter. Analysis of fruit-bearing plants from the Ust-Urt Plateau gave the following air-dry weight percentage composition:

hygroscopic water 5.31, ash 35.26—37.24, cellulose 4.96—5.23, crude protein 5.97—6.31, crude fat 2.46—2.60, nitrogen-free extract 46.09—48.62, starch equivalent 32.27—34.05 (I. Larin). In Fergana the plant provides a source of potash for home production of soap. In addition to potassium, the ash contains a large amount of sodium (Agababyan, Granitov, and Kasimenko).

Note. The species described by E. Korovin from Lake Balkhash, *A. echinopoda* Eug. Kor. in Herb. Univ. As. Med., appears to be identical with *A. eriopoda* and conforms in all characters to the original specimens of the latter.

Section 4. EUANABASIS Bge. Anab. rev. (1862) 36. — Section *Monanthos* Eug. Kor. in Bull. As. Med. f. 20, 4 (1935) 189 (p. p.). — flowers solitary; perianth segments winged in fruit, the wings rather large and always surpassing the smooth succulent fruit.

10. *A. ferganica* Drob. in Trav. Mus. Bot. Acad. Sc. Petr. XVI (1916) 143. — *Brachylepis ferganica* Ulbrich in Engl. u. Prantl, Pflanzenf. 16c, 2 Aufl. (1934) 577. — Ic.: Drob., l. c., t. XVII, f. III, 1—4. — Exs.: HFR no. 1889a (sub *A. eriopoda*).

Undershrub 20—70 cm high, glabrous, pale green or somewhat glaucescent; root blackish, often multicipital and passing into a caudex, this giving rise to several stems; stems terete or obscurely and obtusely 4-angled, often very thick at base, 4—8 mm in diameter, mostly with 15—30 internodes, branched from the base; branches long, in lower part arcuately spreading, then upcurved and upright (f. *candelabra* Iljin) or divaricate (f. *divaricata* Iljin); leaves very short, scalelike, the lower broad-ovate to suborbicular, with white scarious margin, 2—7 mm long including the white-scarious recurved point, partly adnate and in upper part of the stem scarcely evident as semiorbicular scales; flowers solitary; bracteoles lateral, navicular, oval or broader, scarious, much shorter than perianth; perianth segments mostly rounded-ovate, scarious, tardily winged in fruit slightly above the middle; wings semiorbicular or broadly obovate, adherent to and as long as the fruit, entire, roseate (always?), at least twice the length of the perianth; stems with filaments united high up into a crown somewhat shorter than the perianth and bearing semiorbicular glandular lobes; styles short; fruit subglobular, berrylike, 3.5—5 mm in diameter, yellow, greatly surpassing the perianth including wings. April—August.

Saline, sandy-clay, and clayey deserts and takyrs, red sandstone, conglomerates, pebbles, and loess slopes. — Centr. Asia: Kara K. (SE), Syr D., Amu D., Pam.-Al. (W.). Gen. distr.: Afghanistan (?). Described from the Fergana Valley, near the village of Vuadil' on the Ankhov River (in the flowering stage). Type in Leningrad.

11. *A. turkestanica* Eug. Kor. et Iljin in Addenda V, p. 666.

Undershrub, 30—50 cm high, with a long blackish taproot; stems mostly few, pale green, stoutish, 4—10 mm in diameter at base, prominently 4-angled, glabrous, covered with minute glandular warts visible under



PLATE XV. 1. *Anabasis eriopoda* (C.A.M.) Benth.— 2. *A. brachiata* Fisch. et Mey.: a) stem, b) fragment of stem enlarged.— 3. *A. hispidula* (Bge.) Benth.: fruiting perianth.— 4. *A. truncata* (Schrenk) Bge.: a) fragment of stem, b) perianth.— 5. *A. korovinii* Iljin.— 6. *A. gypsicola* Iljin: fragment of stem.— 7. *A. turkestanica* Eug. Kor. et Iljin.— 8. *A. brevifolia* C.A.M.: habit.— 9. Same: ovary.— 10. *A. pelliottii* P. Danguy: fragment of stem.

magnification, averaging 20—25 internodes, branching from base; leaves at stem base reduced to very broad approximate appressed scales; others broadly triangular to triangular-ovate, with yellowish or reddish membranous hyaline-margined periphery and paleaceous point 2—3 mm long, spreading, 6—9 mm long including the point; flowers solitary in the axils; bracteoles lateral, membranous, oval, stiffish in middle part, shorter than flowers; perianth segments membranous, obtuse; filaments of stamens alternating with staminodal lobes, these oval, thickened at the margin and ciliate-glandular, half the length of the perianth or shorter; fruit resembling that of the preceding species. July. (Plate XV, Figure 7).

Argillaceous solonchak deserts. — Centr. Asia: Syr D. Endemic. Described from near Kara-Kamysh well in the Golodnaya Steppe. Type in Leningrad.

12. *A. brachiata* Fisch. et Mey. ex Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 433; Fenzl in Ldb. Fl. Ross. III, 825; Bge. Anab. rev. (1862) 39; 95 Kryl., Fl. Zap. Sib. IV, 960.

Undershrub, 15—25 cm high, glabrous, yellowish-green; root long, cylindric, straight, light brown; caudex firm, woody, often multicipital, hairy-tomentose at stem base; stems numerous, distinctly 4-angled, very brittle, 2—5 mm in diameter, patulous-branched, minutely puncticulate (magnifier!); internodes 10—20, distinctly short-attenuate at base; branches in lower part horizontally spreading to slightly deflexed, then upcurved candelabra-like; leaves scalelike, 2.5—5 mm long, broadly triangular-ovate, prickly-pointed, slightly convex beneath, concave above, spreading, woolly-hairy in the axils; flowers solitary; bracteoles short, herbaceous, navicular-carinate; perianth segments membranous, either oval obtuse or partly narrower oblong, all winged in fruit; wings orbicular or rounded-reniform or broadly obovate, roseate, upright; fruit ovate or rotund, small. (Plate XV, Figure 2 a—b).

Chalks, calcareous and gypseous slopes; growing in small groups. — Caucasus: E. Transc. (Baku — a dubious record); Centr Asia: Ar.-Casp., Balkh., Kara K. (N.), Kyz. K., Syr D. Endemic. Described from the E. shore of the Caspian Sea (Novo-Aleksandrovskaya fort). Type in Leningrad.

Note. There is a single old specimen from the Caucasus, collected near Baku as far back as 1830, and no confirmation has yet come from more recent collections.

Economic importance. The plant is eaten reluctantly by camels only in fall and winter (I. Larin).

13. *A. cretacea* Pall. It. I (1771) 442, app. 493; Fenzl in Ldb. Fl. Ross. III, 824; Shmal'g., Fl. II, 384; Kryl., Fl. Zap. Sib. IV, 959; Il'in in Fl. Yugo-Vost. IV, 228; Bge. Anab. rev. (1862) 36. — Ic.: Pall. Illustr. (1803) tab. IX.

Undershrub, 4—10 cm high, glabrous, yellowish-green; root stout, often tortuous; caudex firm, compactly multicipital, woody, hairy at stem base; stems numerous, tightly approximate, unbranched, with 5—8 internodes, subterete, on drying obtusely 4-angled, 1.5—3 mm in diameter at base; leaves scalelike, triangular-ovate, acutish, broadly scarious-margined, horizontally spreading to ascending, forming with opposite scale a short somewhat divergent sheath, hairy within; flowers solitary in the axils,

296 laterally bracteolate; bracteoles membranous, navicular, shorter than flowers; perianth segments membranous, obtuse, the outer broad-oval, the inner oblong, the three outer developing in fruit suborbicular wings (these roseate in fresh condition), the others wingless or sometimes with small narrower wings; fruit berrylike, ovate or rounded-ovate, compressed, purple or orange. July—August.

Chalk, limestone, marl, mottled clay, and rarely gravelly slopes on other formations; growing in small groups. — European part: L. Don, L. V.; W. Siberia: U. Tob. (S.); Centr. Asia: Ar.-Casp., Balkh. (N.). Endemic. Described from Mt. Uchki in [the former] Ural Region.

Economic importance. Not eaten by any kind of livestock (I. Larin).

14. *A. macroptera* Moq. in DC. Prodr. XIII, 2 (1849) 213; Bge. Anab. rev. (1862) 37.

Undershrub, 3—10 (?) cm high, with a long contorted grayish-brown root and a firm woody tightly multicipital caudex woolly-tomentose at stem base; stems very numerous, glaucescent, glabrous, with 6—12 internodes, unbranched, obtusely terete on drying, brittle; leaves scalelike, scarious-margined, very broadly triangular, very short, obtusish, with dense short hairs in the axils; flowers solitary, laterally bracteolate; bracteoles membranous, small; perianth segments membranous, obtuse, the three outer rounded-oval, the two inner oblong, all developing in fruit semi-orbicular or broadly obovate wings, these broader on the outer segments; staminodal lobes oblong-oval, long-ciliate; fruit berrylike.

Mottled sandstones. — Centr. Asia: T. Sh. (Chon-Guz River in the Kochkorka District). Gen. distr.: Iran. (Afghanistan). Described from W. Afghanistan (vicinity of Topcha, according to Bunge; vicinity of Bamyán, according to Boissier). Type in London.

Note. I am not fully convinced that our specimen does in fact belong to this species, since I had to rely on the description. The species was determined by E. Korovin.

15. *A. truncata* (Schrenk) Bge. Anab. rev. (1862) 38; Kryl., Fl. Zap. Sib. IV, 960. — *Brachylepis truncata* Schrenk in Bull. phys.-math. Acad. Pétersb. II (1844) 193; Fenzl in Ldb. Fl. Ross. III, 828. — *Anabasis kareliniana* Fenzl in Ldb., l. c. (1851) 825.

297 Undershrub, 5—15 cm high, glabrous, glaucescent, more rarely pale green; root stout, long, cylindric, longitudinally splitting, mostly tortuous, light brown; caudex firm, woody, multicipital, woolly at stem base; stems numerous, 1.5—2 mm in diameter at base, obtusely 4-angled to subterete, 8—12-jointed, in upper part with few horizontally spreading branchlets to 3 cm long; leaves reduced to broadly triangular-ovate obtusish or acute (but not prickly-pointed) broadly scarious-margined scales ca. 1—2 mm long, connate in pairs and forming a short sheath, hairy in the axils; flowers solitary in the axils, with membranous navicular bracteoles; perianth segments membranous, obtuse and mostly denticulate at apex, the outer oval or rounded-oval, the inner oblong; fruit globose or transversely ovaloid, somewhat compressed, yellowish-brown (black when dry), 2—3 mm long. July—August. (Plate XV, Figure 4 a, b).

Chalk, mottled clay, and gravelly solonchak slopes. — Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Dzu.-Kash. Described from the Kara-Kingir River. Type in Leningrad.

Note. Tall specimens of this species, up to 20—25 cm in height, occur in the Zaisan area (var. *rezniczenkoi* Iljin). Similarly tall plants, with long pendulous branches and large wings occur along the Zeravshan River (var. *seravshanica* Iljin, in Pasrud). Here also belongs the species established by E. Korovin, *A. bracteolata* Eug. Kor. (in Herb. Univ. As. Med.).

Economic importance. Eaten reluctantly by camels only in fall and winter.

16. *A. aphylla* L. Sp. pl. ed. 1 (1753) 223; Fenzl in Ldb. Fl. Ross. III, 822; Bge. Anab. rev., 40; Shmal'g., Fl. II, 383; Kryl., Fl. Zap. Sib. IV, 961; Il'in in Fl. Yugo-Vost. IV, 228. — *A. tatarica* Pall. Illustr. (1803) 13. — Ic.: Pall., l. c., t. 8; Fl. Yugo-Vost. IV, fig. 289. — Exs.: Fl. cauc. exs., no. 337; HFR no. 3086 a—c. — Vernacular name: itsegek.

Undershrub, 30—75 cm high, branched from the base, glabrous, with succulent terete leafless branches; leaves reduced to barely distinct obtuse broadly triangular scales connate in pairs into short sheaths hairy in the axils; flowers perfect, solitary in the axils of obtuse lanceolate or linear-lanceolate bracteoles, borne at the ends of stems and branches and forming spiciform inflorescences; bracteoles much shorter than flowers; perianth 1.5—2.5 mm long; segments distinct, concave, the three outer rounded-oval to suborbicular, developing in fruit rounded-reniform yellowish or faintly roseate upright wings, the two narrower inner segments wingless or with rudimentary wings; stigmas short and thick; fruit succulent.

Solonetzes, solonetzic solonchaks, takyrs, solonchak *Haloxylon* communities, loess sierozems, sands with a high brackish watertable, and old irrigated crop fields; growing in groups or scattered, often over considerable areas. — European part: Bl. (rarely near the Sea of Azov), Crim.(N.), L. Don (S.), L. V.; Caucasus: Cisc., E. and S. Transc.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D. Gen. distr.: Arm.-Kurd., Iran.(W.), Dzu.-Kash. Described from the shores of the Caspian Sea. Type in London.

Note. Reports for the Black Sea region and the Crimea must be regarded as doubtful.

Economic importance. This plant contains the alkaloid anabesine ($C_{10}H_{14}N_2$), related to nicotine. Although this alkaloid was discovered only in 1929, it has already acquired considerable economic importance. Anabesine plays an important role as an insecticide and replaces nicotine in this respect. It is employed in the form of anabesine sulfate, anabesine base, and solid anabesine. The alkaloid is chiefly contained by young green branchlets. Anabesine is also highly toxic to man, several drops of pure anabesine representing a lethal dose. Production takes place at present at the Chimkent Santonin Works. Industrial use is based exclusively on wild stands which occupy large areas in Kazakhstan and are almost inexhaustible owing to the regeneration capacity of the plants. Other alkaloids present, beside anabesine, are lupinin, aphyllin, and aphyllinin.

Analysis of the plant disclosed an alkaloid content of 1.49 to 2.44 percent and 0.17 percent ammonia. The plant is not eaten by any kind of livestock. Analysis of West Kazakhstan plants gave the following percentage composition on an air-dry basis (two samplings): 1) [former] Gur'ev County, and 2) [former] Dzhambul County: hygroscopic water 7.84—8.65; ash 9.96—10.81, 16.92—18.52; cellulose 17.10—18.55, 6.93—7.59; crude protein 12.09—13.12, 20.96—22.95; albumin (from first sample only) 7.12—7.74; alkaloids (determined only for second sample) 2.24—2.44; crude fat 1.19—1.29, 1.64—1.79; nitrogen-free extract 51.83—56.24, 44.90—49.15; soluble carbohydrates (first sample only) 1.00—1.09 before, and 2.57—2.79 after inversion; corresponding starch equivalents 37.05—39.97. Fruiting Kazakhstan plants from Adai County gave: hygroscopic water 8.25, ash 19.31—21.05, cellulose 7.32—7.88, crude protein 15.22—16.59, alkaloids 1.36—1.49, crude fat 2.61—2.84, nitrogen-free extract 47.38—51.64, starch equivalent 36.57—39.82. The plant is used for soap production; some 40—70 kg of dry herbage burn down to a bagful of ash and this yields about 1.5 kg salts (I. Larin). Young plants from the Volga Delta contained 19% ash on an air-dry basis, of this 44% water-soluble with the following composition: K_2SO_4 8.4180 g, KCl 4.9542, NaCl 10.6161, Na_2CO_3 10.0098, free sodium bicarbonate 5.5249 (Goebel). Fruit-bearing plants from West Kazakhstan contained 18.04% ash: K 2.48, Na 2.98, Cl 0.40, P 2.05, S 0.57, Si 0.2—0.63, Fe 0.03, CaO 1.33, MgO 0.57; computed for sodium the soluble salt content would amount to 0.66. The ash contained SiO_2 3.54, Fe 0.16, CaO 7.36, MgO 3.27, S 3.16, K 13.79, and Na 16.51 (I. Larin).

17. *A. balchaschensis* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, II (1936) 131.

Undershrub, 15—40 cm high, profusely branched, the stems and woody twigs covered with light gray bark; green shoots branching, glabrous; internodes 10—20 mm long and 1—2 mm thick, subterete, smooth, the uppermost shorter; flowers solitary in the axils of scales at the ends of branches, forming very loose inflorescences; bracteoles suborbicular, convex, obtuse, thickish, scarious-margined; perianth segments small, suborbicular or oval, thickish in lower part, scarious above, obtuse, indurated in fruit, to 2 mm long, winged at summit; wings broadly obovate to reniform, 2.5—3.5 mm broad and 2.5—3 mm long, erect or slightly declinate, entire; lobes of the hypogynous disk thin, scarious, not thickened at the margin; stigmas 5; Fl. end of July—September; fr. September—October.

Gravelly deserts; penetrating into sands. — Centr. Asia: Balkh. Gen. distr.: Dzu.-Kash. Described from the Chu River valley. Type in Leningrad.

18. *A. pauciflora* M. Pop. sp. nova in Addenda p. 667.

Undershrub, profusely branched, 30—40 cm high, with stoutish spreading branches; leaves reduced to very short scales united in a sheath; flowers few, solitary, borne on lateral branches, but not forming a spiciform inflorescence as in the preceding species; perianth relatively large; segments almost flat, all winged at summit; wings small, subhorizontally spreading. Fr. October.

Argillaceous solonchak slopes. — Centr. Asia: Balkh. Described from the shores of Lake Balkhash where it was collected near Koundrad. Endemic. Type in Alma-Ata.

Note. I have not seen the plant myself. Its inclusion in the Flora of the USSR is based on a description sent by M. G. Popov.

19. *A. gypsicola* Iljin in Mat. Komiss. exps. issl. Akad. Nauk, no. 26 (1930) 278.

Undershrub to 50 cm high, profusely branched from the base; stems and annual branches distinctly 4-angled, glabrous, smooth; leaves reduced to scales, deltoid-triangular, greenish below, yellowish toward apex, terminating in a long slender point, with a tuft of hairs in the axil; flowers solitary in the axils; perianth segments membranous, three broader and developing in fruit semiorbicular wings, the other two oblong and unchanged in fruit; filaments of stamens alternating with oblong fimbriate staminodal lobes; fruit ovate. July. (Plate XV, Figure 6).

Loose gypsiferous clays. — Centr. Asia: Ar.-Casp., T. Sh. (Kara-Tau foothills). Endemic. Described from four locations, the first of which was Chagrai on the Ust-Urt Plateau. Type in Leningrad.

20. *A. elatior* (C. A. M.) Schischk. in Kryl., Fl. Zap. Sib. IV (1930) 961. — *A. phyllophora* Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 731; Fenzl in Ldb. Fl. Ross. III, 822; Bge. Anab. rev. (1862) 41. — *A. subulifolia* Schrenk in Bull. phys.-math. Acad. Pétersb. I (1843) 360. — *Brachylepis elatior* C. A. M. in Bull. de l'Acad. de St. Pétersb. VIII (1840) 341; Fenzl in Ldb. Fl. Ross., III, 826. — *B. intermedia* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 432. — Ic.: Bong. et Mey. Verzeichn. d. Pfl. am. Saisangnor. (1842) tab. 15.

Undershrub, 15 — 35 cm high, glabrous, in the old lower woody part rather loosely and repeatedly branched, with grayish bark; stems numerous, erect or somewhat ascending, pale green, glabrous, slightly wrinkled when dry, terete (except for the youngest twigs which become somewhat 4-angled on drying), simple or more often branched in the inflorescence or in the upper part, with 10—20 internodes, in lowest part 1.5—2.5 (rarely 3) mm in diameter, the branches obliquely ascending; leaves trigonous-subulate, usually appressed to stem, mostly 2—3 (rarely to 5) mm long including the united portion, terminating in a colorless bristle 1.5—2.5 mm long; flowers solitary in the axils, forming dense spiciform inflorescences at the ends of stems and branches; bracteoles shorter than flowers, navicular, membranous; perianth segments obtuse, the outer rounded-ovate, winged in fruit about the middle, the semiorbicular or reniform yellowish or roseate wings usually convex, the inner narrower and wingless; fruit succulent, rotund, 2—3 mm in diameter, compressed, yellow or roseate. July—August.

Solonchak *Haloxylon* communities, solonchak sand borders, desert plant communities on gravelly saline soils. — Centr. Asia: Balkh. Gen. distr.: Dzu.-Kash. Described from Lake Zaisan. Type in Leningrad.

21. *A. korovini* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, II (1936).

Undershrub, 12—20 cm high, with taproot giving rise near the surface to numerous branches, these tufted, slender, short, woody, branched in turn; annual shoots glaucescent or glaucous, glabrous, subterete or obscurely

301 4-angled, simple and subarcuately ascending in lower part, branched only in upper part or in inflorescence, with 10—15 internodes, 1.25—1.75 mm in diameter at base; leaves subulate, 2—3 mm long, spreading and slightly recurved, terminating in a colorless caducous bristle 1.5—3 mm long; flowers in the axils of very short broad rounded obtuse scalelike bracts; bracteoles small, carinate, shorter than flowers, herbaceous, scarious-margined; perianth segments membranous, broad-oval, obtuse, two of them narrower, oblong, three broader, winged in fruit slightly above the middle; wings semiorbicular, subopaque, at first roseate, erect; filaments of stamens alternating with oblong glandular-fimbriate lobes of the disk, these somewhat shorter than perianth; stigmas short, thickish; fruit oblong-oval to oval, compressed, fleshy, ca. 2—3 mm long. July—August. (Plate XV, Figure 5).

Gravelly and clayey slopes of cone-shaped hills. — Centr. Asia: Dzu.-Tarb., T. Sh. (E.). Endemic. Described from the Ketmen Range between Achenakho and Kol'dzhat. Type in Leningrad.

22. *A. jaxartica* (Bge.) Benth. in Benth. et Hook. Gen. pl. III (1883) 73. — *Brachylepis jaxartica* Bge. in A. H. P. VI, 2 (1880) 443. — Ic.: Opr. rast. Tashk. II (1924), fig. 136.

Undershrub, 15—30 cm high, grayish-green, glabrous; root long, cylindric, to 1.5—2 cm in diameter; caudex firm, woody, often multicapital, woolly-hairy in scale axils; stems rather numerous, with at least 12 internodes, divaricately much branched slightly above the base, in lower part subterete, in upper part almost 4-angled like the branches; leaves ovate, the upper mostly rounded-ovate, all scarious-margined, somewhat convex beneath, terminating in a prickle or a very short bristle and together with it 3—5 mm long, subhorizontally spreading, with a tuft of hairs in the axil; flowers solitary in the axils, forming a very loose spiciform inflorescence; bracteoles navicular, herbaceous, carinate, shorter than flowers; perianth segments membranous, with almost pellucid margins, minutely and irregularly erose-toothed, obtuse, the outer oval, the inner oblong; stigmas thick, obtuse, short; fruit unknown. June.

Dry solonchaks, and stony solonchaks slopes. — Centr. Asia: Syr D., Dzu.-Tarb. Endemic. Described from a location between the Syr Darya River and the city of Tashkent. Type in Leningrad.

23. *A. hispidula* (Bge.) Benth. in Benth. et Hook. Gen. pl. III (1883) 73. — *Brachylepis hispidula* Bge. in A. H. P. VI, 2 (1880) 443.

302 Undershrub, 25—50 cm high, light grayish-green, covered throughout with very short hairs; root long, cylindric, to 1.5—2 cm in diameter; caudex compactly capitate, woody, to 5—10 cm in diameter, densely woolly in scale axils; stems numerous, with 12—17 internodes, divaricately much branched slightly above the base, terete in lower part, almost 4-angled above like the branches; leaves reduced, 3—5 mm long, ovate to oblong-ovate, horizontally spreading, with a tuft of hairs in the axil, the lower scalelike, yellowish-membranous, hyaline-margined, acuminate, the upper and especially the ramal thickish, grayish-green, prickle-pointed; flowers solitary in the axils; segments oval, obtuse, membranous, semipellucid,

minutely erose-toothed, two or three winged in fruit near the summit; wings orbicular or obovate, rosy-purple, irregularly incised-toothed, mostly spreading; fruiting perianth including wings 8—12 mm across; fruit berrylike, ovate, dark, 4—6 mm long and 3—5 mm in diameter, beaked. June—August. (Plate XV, Figure 3).

Gravelly and argillaceous-gravelly slopes, usually in wormwood desert-steppe foothill areas. — Centr. Asia: T. Sh., Mtn. Turkm. Endemic. Described from the Karakskaya Steppe in Syr Darya Region. Type in Leningrad.

Genus 434. **ARTHROPHYTUM** * SCHRENK.

Schrenk in Bull. phys.-math. Acad. St. Pétersb. III (1845) 211.

Flowers perfect, 5-merous, with lateral herbaceous usually stiffish bracteoles, solitary in the axils of leaflike or scalelike bracts; perianth membranous or at the middle herbaceous; segments distinct, with basal tufts of flexuous hairs, developing in fruit membranous wings at the summit or somewhat above the middle; stamens 5; anthers oblong-oval or rounded-oval, unappendaged or minutely appendiculate; filaments alternating with thickened glandular-margined or glandular-fimbriate lobes of the hypogynous disk [staminodal lobes] (only in *A. iliense* have no glands been observed); ovary with 2—5 short thick subsessile stigmas; seed horizontal, with spiral embryo; flowering branches arising from green shoots of the current year or from upper internodes of unbranched stems. Small shrubs or undershrubs, with brittle jointed stems; leaves opposite, subulate, sometimes obsolescent. The genus contains about 20 species.

303

- 1. Staminodal lobes bilobulate, eglandular (Section 1. *Ammodendroides* Iljin) 1. *A. iliense* Iljin.
- + Staminodal lobes semiorbicular or subtruncate, glandular or glandular-fimbriate (Section 2. *Euarthrophytum* Iljin) 2.
- 2. Flowers disposed in a panicle inflorescence with subhorizontally spreading branches; wings also subhorizontally expanded in maturity (Series 2. *Leptoclada* Iljin) 3.
- + Pulvinate plants; flowers in short spiciform inflorescences; wings erect in maturity (Series 1. *Lehmanniana* Iljin) 4.
- 3. Plants 15—30 cm high; leaves 5—8 mm long, obliquely ascending. Pamir 7. *A. wakhanicum* (Pauls.) Eug. Kor.
- + Plants 25—60 cm high; leaves 1—3 mm long, appressed to stem or but slightly divergent. Mountainous Tadzhikistan 6. *A. leptocladum* M. Pop.
- 4. Leaves hemispherical; branches sprawling over the ground 5. *A. betpakdalense* Kor. et Mir.
- + Leaves cylindric; branches not sprawling 5.
- 5. All leaves apiculate or prickly-pointed 6.
- + Lower leaves acute but not apiculate, the upper obtuse or slightly clavate, sometimes terminating in a sharp tubercle 2. *A. lehmannianum* Bge.

* From the Greek words arthron, joint, and phyton, plant.

6. Leaves straight; bracteoles leaflike, many times the length of flower 3. *A. subulifolium* Schrenk.
- + Leaves reflexed; bracteoles short, as long as flower or in fruit slightly shorter 4. *A. litwinowii* Eug. Kor.

Section 1. *AMMODENDROIDES* Iljin in Journ. Bot. de l'URSS, XIX, 2 (1934) 171. — Vegetative plants resembling in habit *Haloxylon ammodendron*, but developing leaves; staminodes bilobate, thickened at the margin, glabrous.

1. *A. iliense* Iljin in Journ. Bot. de l'URSS, XIX, 2 (1934) 171; Acta Inst. Bot. Ac. Sc. URSS, ser. 2, II (1936) 125. — *Anabasis iliensis* Kor. et Mir. in Acta Univ. As. Med. ser. VIII-b, fasc. 29 (1935) 22.

Undershrub, 15 — 30 cm high, glabrous, pale green, in lower part with numerous perennial branches covered with whitish-gray transversely split bark and branching from base; annual shoots subterete and 1.5 — 2 (2.5) mm in diameter in lower part, obscurely 4-angled above, with 8 — 15 internodes; leaves subulate, 3 — 7 mm long, stiffish, gradually attenuate, prickly but without a distinct terminal bristle or cusp, spreading and slightly arched-recurved; flowers solitary in the axils; bracteoles herbaceous, broad, obtuse, obtusely carinate, scarious-margined, as long as and enveloping the flower; perianth segments suborbicular or broadly oval, membranous, becoming indurated in middle part, obtuse, with tufts of hairs in the axils; wings developing in late fall near the summit, semiorbicular or reniform; stamens with oval or oblong-oval anthers; filaments united at base into a broad hypogynous disk 1 — 1.2 mm long and nearly equaling the perianth; staminodal lobes thickened at the margin, glabrate, sessile; seeds horizontal. Fl. June — July; fr. September — October. (Plate X, Figure 6 a, b).

Argillaceous, sandy-argillaceous, and gravelly deserts. — Centr. Asia: Balkh. (especially in the Ili River valley). Gen. distr.: Dzu.-Kash. Described from Sarytogol in the former Dzharkent County. Type in Leningrad.

Note. E. P. Korovin, in his publication "Ocherki po istorii razvitiya rastitel'nosti Srednei Azii" [Outline of Development of the Vegetation of Central Asia] (Byull. Srediaz. Gos. Univ., 20, 1935, pp. 188 and 189) and again jointly with B. Mironov in "Obzor roda *Arthropytum* Schrenk i ego polozhenie v sisteme" [Review of the Genus *Arthropytum* Schrenk and its Systematic Position] (Tr. Sr. Az. Gos. Univ. ser. VIII-b, No. 29, 1935, p. 22), refers this species, recently described by me, to the genus *Anabasis*, establishing a new combination. This approach is based, in our opinion, on erroneous confounding by these authorities of two species that actually belong to different genera. The plants in question are *Arthropytum iliense* Iljin, an undershrub with developed leaves and horizontal fruits, growing in a relatively restricted territory to the south of Lake Balkhash, and *Anabasis balchaschensis* Iljin, also a species lately described by us, with leafless shoots and vertical fruits, occupying a more extended area.

Section 2. *EUARTHROPHYTUM* Iljin in Journ. Bot. de l'URSS, XIX, 2 (1934) 171. — Lobes of the hypogynous disk semiorbicular or subtruncate, glandular or glandular-fimbriate.

Series 1. *A. lehmanniana* Iljin, l. c. — Inflorescences short, spiciform.

2. *A. lehmannianum* Bge. Anab. rev. (1862) 46 (nomen); Litw. in Trav. Mus. bot. Acad. Pétersb. XI (1913) 33. — *Anabasis affinis* Bge. Reliq. Lehm. (1851), 304 (non Fisch. et Mey.). — *Haloxylon subulifolium* Bge. in A. H. P. VI (1880) 438 (p. p.). — *Arthrophytum pulvinatum* Litw., l. c., (1913) 32. — Ic.: Litw., l. c., ill. III and pl. I, fig. 2 and ill. II and pl. I, figs. 3 and 4 (sub *A. pulvinato*). — Exs.: HFR no. 2421 (sub *A. pulvinato*).

Undershrub, 5—15 cm high; root stoutish, woody, tortuous, giving rise to numerous branches, these woody, profusely branched in turn, crowded on the ground surface, terete, forming together with the branched shoots of the current year more or less hemispherical cushions; leaves terete, (3) 4—7 mm long and ca. 0.5 mm in diameter, reflexed, the lower acute, the upper and especially the floral obtusish, often subclavate and almost horizontally spreading; flowers solitary in the axils; bracteoles as long as or slightly surpassing the flowers, broad-ovate, convex, scarious-margined in lower part, mostly apiculate; perianth segments scarious, acute, convexly upcurved and connivent at tips, developing wings near the summit, these scarious, reniform or semiorbicular, erect, initially roseate, subsequently turning paler; lobes of fruiting perianth reflexed and vertically descending; staminodal lobes somewhat semicircular, glandular.

Gravelly and argillaceous-gravelly solonetz slopes. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K. Endemic. Described from inferior and inadequate specimens collected from the sands of the Kyzyl-Kum Desert. Type in Leningrad.

Economic importance. The plant provides acceptable fall and winter forage for camels and sheep and, to some extent, for horses. Analysis of fruit-bearing plants from West Kazakhstan (Katyn-yar) gave the following percentage composition: hygroscopic water 6.65, ash 30.39—32.5, cellulose 10.42—11.16, crude protein 4.84—5.19, albumin 3.26—3.37, crude fat 2.35—2.52, nitrogen-free extract 45.40—48.63, soluble carbohydrates 0.9—1 and 1.46—1.56 before and after inversion, respectively; starch equivalent 23.26—24.91. Another analysis from the same source (I. Larin) refers to another species, *A. subulifolium*, but we refrain from reporting it, since the geographical indication points either to the species under consideration or to *A. litwinowi*.

Note. In a study just published by E. Korovin and B. Mironov, which gives a review of the genus *Arthrophytum* (Acta Univ. As. Mediae, ser. VIII-b, No. 29, 1935), descriptions are supplied of three new species: *A. betpakdalense* Kor. et Mir., *A. longibracteatum* Eug. Kor., and *A. affine* Kor. et Mir. The first of these species is reported by us below, as being free of any doubt. As regards the two others, the lack of the original specimens and of time (the publication appeared when our manuscript had already been sent to press) precluded critical treatment and we can do no more than mention them in passing. It would appear, moreover, that the authors are not quite convinced as to their specific standing. In connection with *A. longibracteatum* Eug. Kor., we read

that "the species resembles closely *A. subulifolium* and more particularly *A. lehmannianum* ... the distinguishing characters are insignificant ... and consist chiefly in the elongated bracteoles which greatly surpass the flower... *A. longibracteatum* is undoubtedly to be regarded as an ecological race that has not yet acquired geographical distinctiveness" (p. 16). With regard to *A. affine* Kor. et Mir, it is stated that "the species described hardly differs in appearance from *A. lehmannianum* and resembles it closely in size, leaf shape, etc. It is primarily distinguishable from that species in the absence of hair tufts in the leaf axils ... this species may prove to be an as yet unstabilized form in the course of differentiation of the preceding species. For the time being we raise the form to specific rank" (p. 22). In view of these circumstances and pending the critical revision of the entire genus projected by us for the near future, we are not in a position to report these forms in the "Flora" as independent species.

3. *A. subulifolium* Schrenk in Bull. phys.-math. Acad. Pétersb. III (1834) 211; Fenzl in Ldb. Fl. Ross. III, 821; Kryl., Fl. Zap. Sib. IV, 944; Litw. in Trav. Mus. Bot. de l'Acad. Pétersb. XI (1913) 28. — *Haloxylon subulifolium* Bge. in A. H. P. VI (1880) 438 (p. p.). — Ic.: Litw., l. c., ill. 1 and pl. I, fig. 1; Acta Univ. As. Med. ser. VIII-b, 21, f. 10.

Undershrub, 5—10 cm high, with a compact tuft of short woody branches arising from a stout woody root; shoots of the current year numerous, crowded, erect, terete, ca. 1—1.5 mm in diameter, smooth; leaves subulate, 5—12 mm long, straight, gradually attenuate, somewhat divergent from the stem but not recurved; bracts strongly divergent; flowers solitary in the axils; bracteoles stiffly herbaceous, tapering to a point, much longer than flowers but shorter than the bracts; perianth subglobose, the segments orbicular or broad-ovate, membranous, indurated in fruit and developing erect wings near the summit; lobes of fruiting perianth strongly recurved; staminodal lobes, as in the preceding species, subtruncate, scarcely semiorbicular, glandular. (Plate X, Figure 7).

Gravelly conical hills. — Centr. Asia: Balkh. Endemic. Described from Mt. Dzhambyl, not far from the eastern shore of Lake Balkhash. Type in Leningrad.

Economic importance. Apparently of the same feed value as the preceding species.

4. *A. litwinowii* Eug. Kor. in Not. Syst. ex Herb. Hort. Bot. Reip. Ross. V, 11—12 (1924) 1.

Undershrub, 5—10 cm high, with a short woody stem and a rather compact tuft of short woody branches; shoots of the current year numerous, yellowish-green, terete, ca. 1—2.5 mm in diameter, simple or branched; leaves thickish, subulate, 4—7 mm long and ca. 0.5 mm in diameter, tapering to a point, divergent or recurved; bracts subhorizontally spreading; flowers solitary; bracteoles oval or rounded-oval, convexly carinate, fleshy, stiffish, terminating in a thickish cusp, as long as or in fruit slightly shorter than flower; perianth subglobose; segments obtuse, indurated in fruit, 1-nerved, developing near the summit suborbicular membranous erect yellowish wings; lobes of fruiting perianth strongly recurved; staminodal lobes glandular; fruit depressed at the top. May—June.

Gravelly soils. — Centr. Asia: Kyz. K. (S.), Kara K. (N.). Endemic. Described from the sands of the Kara-Kum Desert near Mirza-Chele. Type in Tashkent; cotype in Leningrad.

Economic importance. Most probably of the same feed value as the two preceding species.

5. *A. betpakdalense* Eug. Kor. et Mir. in Acta Univ. As. Med. ser. VIII-b, fasc. 29 (1935) 19. — Ic.: l. c., t. 3, p. 20.

A depressed undershrub, 10–20 cm high and to 60 cm in diameter; root slender, vertical; branches of first order long, slender, sprawling, divaricately branched; annotinous twigs jointed, ascending, simple, glabrous, 1–4 cm long; leaves of two kinds, glaucous, 3–6 pairs per twig; leaves of the lowest spring-produced pair promptly wilting and deciduous, linear, semiterete, curved, obtusish; summer leaves semi-globose, concave on the inside, narrowed at base into a short petiole, 3–8 mm long and 3–6 mm broad at the middle; lower leaves sterile or but 1 or 2 or rarely 3 upper pairs enlarged at base and subtending a flower; wings slightly crumpled at the margin, entire, brown, vertically inserted by their broad base; hypogynous disk globular, dissected nearly to the base, hence deeply 5-lobed, enveloping the ovary; staminodal lobes transversely oval, their slightly thickened margin papillose; filaments of stamens linear, persistent on the disk after shedding of anthers; anthers 0.5 mm long, soon caducous, oval, 2-locular, apiculate, the locules free up to the middle; immature ovary 1–1.5 mm in diameter, globular, the upper part rigid and bony, the lower membranous; styles 2, short, rather thick, the flat oblong-oval stigmas 0.5 mm long, soon falling densely; papillose on the inner face; bracteoles free, membranous except the fleshy-herbaceous uppermost part, 2–3 mm long and as broad; immature perianth squarely truncate; segments 1.2 mm long, distinct to the base, membranous, thickened and incurved at tips, with a distinct midrib developing into a keel in fruit; all five segments unchanged in fruit but winged, the wings nerveless, membranous.

Takyr hollows. — Centr. Asia: Balkh. (Bet-Pak-Dala). Endemic. Described from Kampyr-mol in the E. part of the Bet-Pak-Dala Desert. Type in Tashkent.

Series 2. *A. leptoclada* Iljin, l. c. — Flowers in a paniculate inflorescence.

6. *A. leptocladum* M. Pop. ex Iljin in Journ. Bot. de l'USSR, XIX, 2 (1934) 171 (nomen) et in Addenda V, p. 667. — *Haloxylon leptocladum* Eug.-Kor. in Acta Univ. As. Mediae, ser. VIII-b, fasc. 29 (1935) 22.

Shrublet 25–60 cm high, with a rugged profusely branched stem covered with grayish bark; shoots of the current year rather rigid, not succulent, glabrous, smooth, terete, pale green or glaucous; leaves terete, thickish, rather stiff, 1–3 mm long (on green shoots), obtusish, appressed or slightly divergent; flowers solitary in the axils of scalelike bracts; bracteoles orbicular, obtusely carinate, stiffish, green, narrowly scarious-margined, as long as or but slightly shorter than flower; inflorescence broadly paniculate, composed of elongated spikes; perianth segments subherbaceous,

scarious-margined, obtuse, winged in fruit just above the middle; wings suborbicular, membranous, rounded at base, horizontally expanded, with a span of 7—8 (10) mm; filaments connate for much of their length into a hypogynous disk, alternating with semiorbicular glandular-ciliate staminodes, these reaching above the middle of the perianth; fruit 2—2.5 mm in diameter, concave at the top, loosely enveloped by lobes of fruiting perianth. April—May.

Gravelly slopes, pebbles, pebble-and-sand deserts, saline sand borders, and clayey solonchak soils. — Centr. Asia: Amu D., Pam.-Al. (SW).

Gen. distr.: Iran. (Afghanistan?). Described from Kelif on the Amu Darya River. Type in Leningrad.

7. *A. wakhanicum* (Pauls). Eug. Kor. comb. nova in Herb. Inst. Bot. Ac. Sc. USSR; Iljin in Journ. Bot. de l'USSR XIX, 2 (1934) 171. — *Anabasis wakhania* Pauls. in Vidensk. Meddel. fra den naturh. Foren. Kbhvn. (1903) 201. — *Haloxylon wakhanicum* Eug. Kor. in Acta Univ. As. Med. ser. VIII-b, fasc. 29 (1935) 23.

Undershrub, 15—30 cm high, glabrous; root tortuous and strongly curved, in the lower woody part rugged, crowned by very short crowded remnants of preceding year's branches; green stems numerous, rather brittle, rigid, 309 not succulent, somewhat shining, virgate, very obtusely 4-angled or subterete, consisting of 15—25 internodes, in lower part 1—1.5 mm in diameter, branched in inflorescence or in upper part, rarely in lower part, the branches obliquely ascending; leaves slender, filiform-terete, stiffish, 5—8 mm long and 0.4—0.5 mm in diameter, subacute, upright, with short hairs in axils; flowers solitary in the axils of short ovate scalelike bracts, gathered at the ends of stems and branches into spiciform-paniculate inflorescences; bracteoles oval or broad-ovate, herbaceous, obtusely carinate, scarious-margined; bracts and bracteoles shorter than flowers; perianth segments ovate or oval, dark smoky-membranous, obtuse, white-hyaline-margined, winged in fruit at or slightly above the middle; wings suborbicular or broadly obovate, with a span of 6—8 mm; stamens with filaments united at base into a ring and alternating with semiorbicular glandular-ciliate staminodal lobes; stigmas short, thickish, on a very short style; ovary fleshy; fruit succulent. August.

Stony slopes and stony riverbeds. — Centr. Asia: Pam.-Al. (Pamir). Endemic. Described from Roshan in the Pamir (Nusur Valley on the Shodau River). Type in Copenhagen.

Genus 435. **ILJINIA*** EUG. KOR.

Eug. Kor. in Addenda V, p. 665.

Flowers perfect, solitary, axillary, sessile, bracteolate; perianth globular, slightly compressed, developing in fruit 5 winglike appendages at the summit; stamens 5, united at base into a hypogynous disk with ciliate lobes; anthers unappendaged; ovary horizontal, with 2 short broad obtuse subsessile stigmas. Plants with alternate leaves and branches jointed at base. A monotypic genus.

* Named for M. M. Il'in, responsible for the treatment of this family.

1. *I. regelii* (Bge.) Eug. Kor. in Acta Univ. As. Med. sér. VIII-b, fasc. 29 (1935) 23. — *Haloxylon regelii* Bge. in Bull. Acad. Sc. Pétersb. X (1869) 368. — *Arthrophytum regelii* Litw. in Bull. Acad. Sc. Pétersb. VI (1912) 606. — *Salsola regelii* Litw., l. c. — Ic.: Acta Univ. As. Med. sér. VIII, 26 (1935) f. 11.

310 Undershrub, 20–40 cm high, profusely branched, covered in woody part with light gray bark; branches whitish, smooth, glabrous; shoots and leaves green, often turning black in drying; younger twigs after fruiting distinctly jointed at base and readily falling at the joint; leaves alternate, terete, slightly clavate, obtuse, glabrous, always falcately upcurved, with very short axillary hairs sometimes united into a fringed-incised scarious ligule; bracteoles semiorbicular, convex, scarious-margined, shorter than to about equaling the perianth; perianth globular, glabrous, small; segments semiorbicular, scarious-margined, winged in fruit at the summit; wings suborbicular or broadly reniform, equal, irregularly suberect or some later recurved; stamens with short filaments united into a broad ring and alternating with semiorbicular minutely ciliolate-margined staminodal lobes; anthers unappendaged; stigmas short, broad, obtuse, subsessile or borne on an obsolescent style. July–September. (Plate X, Figure 8).

Argillaceous and gravelly solonchak sites. — Centr. Asia: Balkh., Dzu.-Tarb., T. Sh. (Issyk-kul'), Syr D., Amu D. (Kugitang). Gen. distr.: Dzu.-Kash. Described from the shores of Lake Sary-Togoi, in the central part of the Charyk River valley in the Issykkul'skii District. Type in Leningrad.

Genus 436. **HALOXYLON*** BGE.

Bge. Reliq. Lehmann. (1851) 291.

Flowers perfect, 5-merous, with a pair of submembranous bracteoles, solitary in the axils of scalelike bracts; perianth segments membranous, distinct, with basal tufts of flexuous hairs, developing in fruit at the summit broad membranous overlapping wings; stamens 5; anthers oblong-oval, unappendaged; filaments exserted, united at base into a hypogynous disk; staminodal lobes 5, thin, glabrous, not thickened; ovary with 2–5 very short subsessile stigmas; seeds horizontal, with spiral embryo; flowers borne on short twigs arising directly from the branches of the preceding year, on basal internodes. Trees or more rarely shrubs, with jointed, brittle stems and reduced or obsolete opposite leaves. The genus contains 5 species. Russian name: saksaul.

1. Leaves terminating in a stramineous aristate point appressed to stem 1. *H. persicum* Bge.
- + Leaves not aristate, obsolete or reduced to a tubercle 2.
2. Shrubs; wings cordate at base; mature fruit loosely enveloped by the reflexed perianth segments 3. *H. ammodendron* (C. A. M.) Bge.
- + Trees; wings rounded or cuneate at base; mature fruit tightly embraced by the perianth lobes 2. *H. aphyllum* (Minkw.) Iljin.

311

1. *H. persicum* Bge. ex Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 189. — *H. ammodendron* Bge. in Ldb. Fl. Ross. III, 2 (1851) 820 (p. p.) et auct. plur. (p. p.). — *Arthrophytum ammodendron* var.

* From Greek *halos*, salt, and *xylon*, tree.

acutifolium Minkw. in Fedde Repert XI (1912) 478; Knorring and Minkv., Rast. Perovsk. u. (1913) 86. — *A. persicum* R.-Sav. in Not. syst. ex Herb. Hort. Bot. Reip. Ross. V (1924) 45. — *A. acutifolium* Minkw. Chenop. Turk. in B. Fedchenko, Rast. Turk. (1915) 360 et in O. et B. Fedtsch. Consp. Fl. Turk. VI (1916) 237. — *A. arborescens* Litw. in Trav. d. Mus. Bot. Acad. Sc. Pétersb. XI (1913) 44. — *Anabasis saxaul* Fisch. et R. Sav., l. c., 46. — Ic.: Litw., l. c., plates 3 and 4. — Exs.: HFR no. 228 (p. p. quoad pl. floriferam). et 2422 a-c; Sintenis It. transcasp. - pers. 1900-1901, no. 1250; Litw. Pl. turcom. exs. no. 94, 168, 398.

Tree, to 5 m high, with a stout rugged stem and light gray bark; wood heavy, brittle, without dark heartwood; branches of the preceding year whitish, densely covered with circular cracks; annotinous shoots pale green, rather rigid, 1-2 mm in diameter, in young plants erect, in old ones often drooping; leaves reduced, scalelike, terminating in a stramineous cusp appressed to stem; flowers solitary in the axils of obtuse scalelike bracts, borne on very short determinate twigs; bracteoles rounded-oval, scarious-margined, obtusely carinate, as long as the flower; perianth segments obtuse, membranous, winged in fruit near the summit; wings suborbicular or subreniform-semiorbicular, usually somewhat twisted, rounded or subcordate at base, with a span of 9-12 mm; fruit depressed, 2-2.5 mm in diameter, but slightly surpassing the winged perianth. April-May. (Plate X, Figure 9 a-c).

Sandhills and sand ridges; forming stands. — Centr. Asia: Ar.-Casp. (S. and E.), Balkh., Kyz. K., Kara K., Syr D., Amu D. Gen. distr.: Dzu.-Kash., Iran. Described from near Dzhendak and Enarek in Iran. Type in Leningrad.

Economic importance. This species is of enormous importance as fuel in the desert areas of Central Asia. It compares favorably in thermal efficiency with bituminous coal, burns down to long-smoldering cinder which is finally transformed into powdery ash (Pelz). The heat-producing capacity amounts, according to Branke, to 3660 small calories for air-dry weight counting in moisture content, and 3315 small calories including water vapor. The highest temperature attainable by combustion of a weight unit of fuel is 87.5°C for air-dry weight. The ash residue of the wood fluctuates between 36 and 50 per cent (Prof. Branke's data do not record the species of *Haloxylon*). The estimated yield per hectare is 400 poods [1 pood = 36.11 lbs] of dead and 120 poods of fresh wood. V. Dubyanskii puts the figure in the Kara-Kum Desert at 1500-3000 poods per hectare. The demand for wood in Central Asia is great: the population uses about 9 million poods per annum and the railroads about one million (Maretskii). The wood is durable, heavy, sinking in water, breaking rather easily but not splintering. The specific weight is 3.15, 1.01, and 0.09, for fresh wood, deadwood, and brushwood, respectively. *Haloxylon* woods, growing on sands, reach particularly large dimensions in the Muyun-Kum Desert, the sands around Lake Balkhash, and the Kyzyl-Kum and Kara-Kum deserts. The area covered by *Haloxylon persicum* and *H. aphyllum* amounts to about 100 million hectares, of these 6,693,000 ha registered (Maretskii). The plants are also of value in southern regions as forage for camels and sheep, especially in winter. Analysis of Turkmenistan plants gave the following percentage dry weight composition for edible dry shoots of the preceding year and

green shoots of the current year, respectively: hygroscopic water 6.63 and 6.14, ash 10.78 and 13.86, crude protein 7.9 and 7.80, albumin 5.04 and 6.09, crude fat 2.91 and 2.28, nitrogen-free extract 52.86 and 26.51, crude cellulose 26.36 and 49.55 (Agababyan, Granitov, and Kasimenko). The ash is used for extraction of carbonates; the ash yield from the wood amounts to about 5 per cent. The plants are useful for sand fixing. The wood is also used for production of activated carbon.

2. *H. aphyllum* (Minkw.) Iljin in Journ. Bot. de l'URSS, XIX, 2 (1934) 171. — *Arthrophytum haloxylon* Litw. in Trav. du Mus. Bot. Acad. Sc. Pétersb. XI (1913) 45. — *Haloxylon ammodendron* Bge. Reliq. Lehmann. (1851) 292 (p. p.); Fenzl in Ldb. Fl. Ross. III, 820 (p. p.) et auct. plur. — *Arthrophytum* (*Haloxylon*) *ammodendron* var. *aphyllum* Minkw. in Fedde Repert. XI (1912) 478; Minkw. in O. et B. Fedtsch. Consp. Fl. Turk. VI (1916) 236. — *A. aphyllum* Litw., l. c. — "*Pinus orientalis*" Falk Topogr. Beitr. II (1786) 260. — "*Tamarix forte songarica*" Eversmann. Reise nach Buchara (1823) 48, app. 116. — Ic.: Litw., l. c., ill. IV, figs. 13–17, and plates 5 and 6; Acta Univ. As. Med. ser. VIII-b, 21 fig. 49. — Exs.: HFR no. 228 (p. p.), no. 2423 a, b, and c; Litw. Pl. exs. Turcom. no. 284 and 305. Russian names: saksaul chernyi [black], solonchakovyi [solonchak], bezlistnyi [leafless] (kara-saksaul).

313 Trees with rugged often very stout profusely branched stem and dark gray bark; branches slender, light gray, often brownish-tinged; ultimate branches drooping, those of the preceding year densely covered with circular cracks; branchlets of the current year terete, mostly not more than 2 mm thick, green or glaucous, rather succulent, in old trees pendulous; wood firm, heavy, sinking in water, with almost black heartwood; leaves obsolescent, reduced to inconspicuous opposite obtusish or acute tubercles with short axillary leaves; flowers very small, solitary in the axils of scalelike bracts on short indeterminate flowering branchlets; bracteoles small, scarious-margined, surpassing the perianth; perianth segments ovate, membranous, pellucid, hairy, with crisp basal hairs, winged in fruit near the summit at about two-thirds their length; wings suborbicular or rather rounded-obovate, broadly cuneate or rounded at base, horizontally expanded in maturity, with a span of (8) 10–12 mm; lobes of fruiting perianth firmly adherent to the fruit; fruit 2–2.5 mm in diameter, concave at the top, with remnant of style at center; filaments of stamens connate at base into a tall hypogynous disk, alternating with inconspicuous staminodes. April–May. (Plate X, Figure 10).

Saline sand borders, loess-solonchak soils, takyrs, solonetzic and saline takyrlike sierozems; stand-forming. — Centr. Asia: Ar.-Casp. (E. and S.), Balkh., Kyz. K., Kara K., Syr D., Amu D. Gen. distr.: Iran. Described from numerous Central Asian specimens collected within the distribution area indicated.

Economic importance. The plant often forms solid stands, so-called "saxaul *Haloxylon* forests," which are the subject of a specialized branch of forestry. The tree is of great importance in the forests of Soviet Central Asia as a source of high-quality fuel almost equaling bituminous coal in thermal value. The wood is very heavy, nonsplintering

but breaking easily. According to Pelz, it produces long-smoldering cinder of better quality than that of *H. persicum* and burning down to lumpy ash. According to M. Petrov, the yield of wood in the Kara-Kum Desert amounts to 40 tons per hectare. The wood is sold by weight on the markets of Central Asia. In the southern regions the plant is of considerable value as winter forage for camels and sheep. Larin reports the following percentage composition for herbage of fruiting plants from Ust-Urt: hygroscopic water 6.55, ash 23.71—25.37, cellulose 13.17—14.09; crude protein 6.6—7.06, crude fat 1.66—1.76, nitrogen-free extract 48.33—51.72; starch equivalent 33.12—35.42. The species is employed for sand fixing. The herbage is used for potash extraction (M. Petrov).

3. *H. ammodendron* (C. A. M.) Bge. in Ldb. Fl. Ross. III, 2 (1851) 820 (s. str.). — *Arthropytum ammodendron* Litw. in Trav. du Mus. Bot. Acad. Sc. St. Pétersb. XI (1913) 35; Minkw. in O. et B. Fedtsch. Consp. Fl. Turk. V, 236 (p. p.). — *Anabasis ammodendron* C. A. M. in Ldb. Fl. Alt. I (1829) 375. — *A. saxaul* Bge. in herb. Inst. Bot. Ac. Sc. URSS. — *Haloxylon pachycladum* M. Pop. App. ad. Bull. of Appl. Bot. of Gen. and Pl. Breed. XXVI, 3 (1931) 11. — Ic.: Ldb. Ic. pl. Ross. 1 (1829) tab. 47; Litw., l. c., ill. IV, figs. 3—12 and plate 2. — Russian name: saksaul zaisanskii [Zaisan].

314 Shrub, profusely and ruggedly branched, to 100—200 cm high, often hemispherical in shape, with whitish-gray or whitish bark; shoots of the current year green or glaucescent, elongated, rather succulent, 1.5—2 mm in diameter, appressed or pendulous; leaves obsolescent, reduced to obtusish opposite tubercles with short basal hairs; flowers solitary in the axils of scalelike bracts, on short branches subsequently growing out into a brittle vegetative shoot; bracteoles broad-oval, stiffish, broadly scarious-margined, equaling the flower; perianth segments very small, ovate, scarious-margined, hairy, with flexuous basal hairs, winged in fruit near the summit at about three-fourths their height; wings suborbicular, at least three distinctly cordate at base, the two others sometimes cuneate, mostly with a span of 8—10 (12) mm, curved or even obliquely ascending at maturity as in *Anabasis*; lobes of the winged fruiting perianth divergent and thus fruit free in a cuplike hollow formed by the lobes; fruit dark green, concave on the top, with a tubercle at center and surrounded, as in the preceding species, by a ridge ca. 2 mm in diameter; hypogynous disk cup-shaped, glabrous, with scantily developed glabrous staminodes. May.

Submontane sand-and-gravel deserts, dry beds of desert streams, and wormwood-and-meadowgrass loess deserts. — Centr. Asia: Balkh. (Zaisan and Ili deserts). Gen. distr.: Dzu.-Kash., Mong. Described from Zaisan. Type in Leningrad.

Note. As evident from the description, this species is easily distinguishable by its fruit, but, except for its growth habit, it is not readily recognizable by its vegetative characters. M. G. Popov, in describing his *Haloxylon pachycladum* M. Pop., considers it to be a hybrid between *Haloxylon ammodendron* (apparently having in mind the arboraceous *H. aphyllum*) and *Anabasis aphylla*. The plant probably has the same uses as *Haloxylon aphyllum*.

Genus 437. **NANOPHYTON*** LESS.

Less in Linnaea IX (1834) 197.

Flowers perfect; perianth segments 5, membranous, distinct nearly to the base; stamens 5, inserted on a 5-toothed disk, the anthers terminating in a slender appendage; ovary vertical, the stigmas little shorter than the style; bracteoles present; fruit vertical, somewhat fleshy, enclosed in a saccately inflated perianth; embryo spiral. Low shrubs with closely approximate leaves. A monotypic genus.

- 315 1. *N. erinaceum* (Pall.) Bge. in Mém. Acad. St. Pétersb. VII sér., IV, 11 (1862) 51; Kryl., Fl. Zap. Sib. IV, 964; Il'in in Fl. Yugo-Vost. IV, 229. — *Polycnemum erinaceum* Pall. Illustr. (1803) 58. — *P. juniperinum* M. B. in Mém. Soc. Nat. Mosc. I (1806) 154. — *Anabasis sieversii* Willd. in Roem et Schult. Syst. VI (1820) 221. — *A. caespitosa* Steph. in Ldb. Fl. Ross. III, 2 (1851) 829. — *Halimocnemis juniperina* C. A. M. in Ldb. Fl. Alt. I (1829) 386. — *H. macrantha* Kar. in Bull. Soc. Nat. Mosc. XII (1839) 168. — *Nanophyton caspicum* Less. in Linnaea IX (1834) 197; Fenzl in Ldb. Fl. Ross., III, 829. — *N. juniperinum* C. A. M. in Bull. phys.-math. Acad. Pétersb. II (1844) 133. — *N. macranthum* Fisch. et Mey. in Bull. phys.-math. Ac. Pétersb. II (1844) 134; Fenzl in Ldb. Fl. Ross. III, 829. — Ic.: Pall. Illustr. t. 48; Fl. Yugo-Vost. IV (1930) 229. — Exs.: HFR no. 2420.

Undershrub, 5–15 cm high, rigidly cespitose, repeatedly short-branched, compactly pulvinate in outline; stems woody, often very stout; leaves alternate, closely approximate, completely covering up the stems, short, fleshy, subulate, mostly prickle-pointed, rarely obtuse, strongly dilated and hyaline-margined at base, glabrous or scarcely roughened with minute tubercles, with an axillary tuft of long hairs; flowers solitary in the axils of upper leaves; bracteoles navicular, slightly surpassing the flower; perianth segments membranous, ovate, distinct, glabrous, rounded at apex, with a short mucro at some distance from the margin, strongly bladderly-inflated in fruit and elongating to 10 mm; locules of anthers almost entirely free; fruit fleshy, short-stipitate, compressed, vertical, ca. 3 mm long. August–September. (Plate XIV, Figure 3 a–d).

Chalks, and gravelly or stony solonetz slopes; in groups, sometimes over considerable areas. — European part: L. V. (?), Transv.; W. Siberia: U. Tob. (Orsk area), Irt. (south of the city of Semipalatinsk); Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D., T. Sh. (Kara-tau), Amu D. (Zarabulak). Gen. distr.: Dzu.-Kash., Mong. Described from the Guberlya Mountains between Orenburg and Orsk. Type in London.

Economic importance. Useful as forage for camels, sheep, and goats, especially in winter, but not of high quality. Analysis of flowering plants from the Chelkar region (Kazakhstan) gave the following percentage dry weight composition: hygroscopic water 6.83, ash 22.98–24.58; cellulose 21.15–22.94, crude protein 12.1–13, albumin 7.87–8.44, crude fat 2.34–2.47, nitrogen-free extract 34.61–57; starch equivalent 26.96. — 28.94 (I. Larin). According to Agababyan, Granitov, and Kasimenko, the herbage has a fattening effect on the animals mentioned.

Note. Prof. Ulbrich, in his last review of Chenopodiaceae (Engl. u. Prantl. Pflanzenf., 16 c, 2 Aufl. 1934, 579), in conformity with Druce (in Rep. Exch. Cl. Brit. Isle, III, 1914, 421), renames this species *N. acutum* (Falk)

* From Greek nanos, dwarf, and phyton, plant.

Druce, on the grounds that Falk recorded *Camphorosma acuta* L., without diagnosis, as far back as 1786 (Falk, Beitr. II, 1786, 120) for "all Russian, Siberian, and solonchak steppes," borrowing the name from Linnaeus. It must be noted, however, that *Nanophyton* does not occur at all in Russian steppes. To return to Linnaeus, it is stated in Sp. pl. I, ed. 2 (1762) 178, that the plant occurs "in Italia, Tartaria," while in Amoen. Acad. I, 393, where the plant is mentioned for the first time, the reader is referred to an illustration in Lobelius' Ic. stirp. (1591) 404, where this plant is called *Anthyllis altera italorum*, and to *Tabernemontan*, hist. (1687) 57, where it is presented under the name *Camphora altera*. Both illustrations show some annual plant which has no resemblance to *Nanophyton* and is rather reminiscent of *Camphorosma annua* Pall. or *Echinopsilon hyssopifolius* (Pall.) Moq. In view of these considerations we cannot accept the new combination proposed by Druce.

Genus 438. **PETROSIMONIA** * BGE.

Bge. Anabas. rev. (1862) 52.

Flowers perfect, axillary, with a pair of lateral navicular bracteoles; perianth segments 2—5, membranous, distinct, their lower part often cartilaginous in fruit; stamens 1—5; filaments long, flat; anthers oblong, terminating in 2- or 3-toothed appendages often fused; ovary oval or subrotund, compressed laterally, with style and 2 villous stigmas; fruit vertical, with thin scarious smooth and glabrous pericarp; seeds exalbuminous, with spiral embryo. Annual plants, rarely glabrous, mostly covered with appressed or spreading 2-tipped hairs. The genus contains 11 species.

1. All branches and leaves opposite 2.
- + Upper branches and leaves alternate, at least in the inflorescence. . . 3.
2. Filaments exserted 3—4 mm out of perianth; plants mostly covered throughout with spreading hairs, more rarely glabrous or appressed-hairy 11. *P. sibirica* (Pall.) Bge.
- + Filaments scarcely exserted; plants covered with appressed mostly silky hairs 10. *P. brachiata* (Pall.) Bge.
3. Perianth segments as many as stamens 4.
- + Perianth segments and stamens differing in number. 6.
4. Perianth segments and stamens 5 8. *P. glauca* (Pall.) Bge.
- + Perianth segments and stamens 2 or 3 5.
5. Perianth segments and stamens 3 each; anthers with 2-toothed appendages; bracteoles tapering to a narrow mostly reflexed non-gibbous tip 2. *P. triandra* (Pall.) Simonk.
- 317 + Perianth segments and stamens in lower flowers 2 each; anthers unappendaged; bracteoles gibbous 3. *P. litwinowi* Korsh.
6. Perianth segments 2; stamens 5, with fused anther appendages . . . 9.
- + Perianth segments 2—4; stamens 1—3 or very rarely 5; anthers with free appendages 7.
7. Perianth segments 3; stamens mostly 5, more rarely 4, often abortive; plants densely covered with subappressed hairs; leaves falcately recurved 9. *P. squarrosa* (Schrenk) Bge.

* Named for the famous researcher Peter Simon Pallas (1741—1811).

- + Plants glabrous or more sparsely appressed-hairy; stamens 1—3 8.
- 8. A glaucous, rather rigid plant; bracteoles broad-ovate, with reflexed tips; perianth segments 3 or 4, acuminate, with short hairs on the back; stamens 1 or 2, with 2-toothed anther appendages 1. *P. monandra* (Pall.) Bge.
- + A green plant; bracteoles oblong, enlarged at tips, laterally gibbous, closed; perianth segments in upper flowers 2, glabrous, one of them 2-toothed; stamens 3 3. *P. litwinowi* Korsh.
- 9. Perianth segments quite glabrous on the back; stigmas as long as style or nearly so; bracteoles gibbous, closed, longer in fruit than the uppermost bracts 10.
- + Perianth segments fimbriate-hairy on the back at summit; stigmas 2—3 times the length of style; bracteoles not gibbous, always shorter than bracts 10.
- 10. Hairs on stem mostly long, articulate, horizontally spreading. Gypseous solonchaks 7. *P. hirsutissima* (Bge.) Iljin.
- + Hairs appressed or subappressed or rarely plants almost glabrous 11.
- 11. Bracts arched-recurved, acuminate 5. *P. glaucescens* (Bge.) Iljin.
- + Bracts straight, very succulent, slightly constricted at the middle, obtuse or minutely mucronulate 6. *P. brachyphylla* (Bge.) Iljin.

Section 1. OLIGANDRA Iljin (= § 1. *Olygandrae sparsiflorae* Bge. Anabas. rev. 1862, 58). — Stamens 1—3; at least the upper leaves alternate.

1. *P. monandra* (Pall.) Bge. Anab. rev. (1862) 53; Shmal'g., Fl. II, 385; Kryl., Fl. Zap. Sib. IV, 966; Il'in in Fl. Yugo-Vost. IV, 236. — *Polycnemon monandrum* Pall. It. I et app. (1771) 401 et 483. — *Halimocnemis monandra* C. A. M. in Ldb. Fl. Alt. I (1829) 384; Fenzl in Ldb. Fl. Ross. III, 2 (1851) 838. — Ic.: Pall., l. c., t. D. f. 1 et illustr. (1803) t. 49; Sornye rast. SSSR II, fig. 128.

Annual, 5—40 cm high, grayish-green, branched from the base, often clothed with appressed hairs; leaves alternate, numerous and closely approximate, short, linear, very slightly dilated at base (especially the upper ones), upright, finally somewhat arched-recurved; bracts resembling the leaves but shorter, mostly surpassing the flowers; bracteoles longer than flower, broadly ovate, navicular, with reflexed herbaceous tips; perianth segments mostly 3, more rarely 4 or 5, of these 2 or 3 broad-ovate, the other narrow, all membranous, subsequently indurated, acuminate, hairy on the back; stamens 1 or 2; anthers with 2-toothed appendages; stigmas much longer than style. July—September. (Plate XVI, Figure 5 a—c).

Roadsides, refuse dumps, solonchaks and solonchaks; growing in groups or solitary. — European part: L. V.; W. Siberia: U. Tob. (S.); Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from the vicinity of Kalmykovskoe on the Ural River. Type in London.

2. *P. triandra* (Pall.) Simonkai, Enum. Fl. Transs. (1866) 466; Kryl., Fl. Zap. Sib. IV, 967. — *Polycnemon triandrum* Pall. It. I app. (1771) 483. — *Polycnemon salsum* Willd. Sp. pl. I (1797) 192. — *Anabasis*

triandra M. B. Casp. (1800) 154. — *Polycnemum volvox* Pall. Illustr. (1803) 60. — *Halimocnemis volvox* C. A. M. in Ldb. Fl. Alt. I (1829) 383; Fenzl in Ldb. Fl. Ross. III, 2 (1851) 843. — *H. triandra* Moq. in DC. Prodr. XIII, 2 (1849) 197. — *Petrosimonia volvox* Bge. Anab. rev. (1862) 54; Shmal'g., Fl. II, 385; Il'in in Fl. Yugo-Vost. IV, 232. — Ic.: Pall. Illustr. tab. 50; Rchb. Ic. Fl. Germ. XXIV, 173, tab. 294, f. 5—9. — Exs.: HFR no. 2034.

Annual, 5—35 cm high, appressed-hairy, with erect stems divaricately branched from base; leaves filiform-terete, to 4 cm long, alternate except the lowermost; bracts surpassing the flowers, strongly dilated at base; flowers bibracteolate, in a loose spiciform inflorescence; bracteoles ovate, navicular, longer than flower, more convex on the adaxial side, tightly closed, with slightly reflexed tip; perianth segments 3, acuminate, glabrous, 1-nerved; stamens 3, the scarious 2-toothed appendages one-fourth to one-third the length of anther; stigmas longer than style. July—September. (Plate XVI, Figure 4 a, b).

Solonchaks and solonetztes; in groups or scattered. — European part: Bl., Crim., L. Don, L. V.; Caucasus: Cisc., E. Transc.; W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Ar.-Casp. (N.); Balkh. (N.). Gen. distr.: Centr. Eur. Described from the steppes along the Ural River (apparently between Ural'sk and the settlement of Kalmykovskoe. Type in London.

319

Economic importance. In Kazakhstan considered good winter forage for all kinds of livestock and stored in large quantities for this purpose (according to I. Larin).

3. *P. litwinowi* Korsh. Tent. Fl. Ross. or. (1898) 358; Kryl., Fl. Zap. Sib. IV, 970; Il'in in Fl. Yugo-Vost. IV, 235 — *P. diandra* Litw. in Sched. ad Herb. Fl. Ross. VII (1911) 145. — Ic.: Fl. Yugo-Vost. IV, ill. 292. — Exs.: HFR no. 2371 (sub. *P. diandra*), 2035 a, 2035 b et 2036.

Annual, 5—30 cm high; stems decumbent or ascending (var. *diffusa* Litw. in Sched. ad HFR, VII (1911) 12), rarely erect (f. *stricta* Litw., l. c., 13), slender, branched from base, appressed-hairy like the leaves, subsequently mostly glabrous; leaves alternate except the lowermost, short, linear-terete, dilated at base, mostly reflexed at tips; bracts surpassing flowers, herbaceous-tipped; bracteoles navicular, slightly longer and completely enclosing the flower, constricted at the middle and bilaterally gibbous above the constriction; lower flowers with two stamens and two 1-nerved acuminate glabrous perianth segments; upper flowers with 3 stamens and 2 perianth segments of which one normal and the other 2-nerved and deeply 2-toothed; anthers obsoletely apiculate. July—September.

Solonchak and solonetz soils; in groups, often forming dense thickets. — European part: Transv., L. V.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp. (N.), Balkh. (N.). Endemic. Described from the Orenburg District: (1) Grigor'evka, and (2) Pokrovskoe-Karagai. Type in Leningrad.

Economic importance. Of value in fall as forage for camels (I. Larin).

Section 2. *SYNANDRA* Iljin (= *Pentandrae sparsifoliae* Bge. Anab. rev. (1862) 55). — Stamens 5, always with fused appendages (see, however, *P. squarrosa*); at least the upper leaves alternate.

4. *P. crassifolia* (Pall.) Bge. *Anabas. rev.* (1862) 55; *Shmal'g.*, Fl. II, 385; Il'in in *Fl. Yugo-Vost.* IV, 234. — *Polycnemum oppositifolium* Pall. It. I (1771) 422, 431 et app. 484. — *Halimocnemis crassifolia* C. A. M. in Ldb. *Fl. alt.* 1 (1829) 385; Fenzl in Ldb. *Fl. Ross.* III, 2 (1851) 839. — *H. alternifolia* Moq. in DC. *Prodr.* XIII, 2 (1849) 198. — *H. oppositifolia* Eichw. *Enum. Casp.* (1831—33) 2. — *Anabasis oppositifolia* M. B. *Casp. app.* (1800) 154. — *Polycnemum crassifolium* Pall. *Illustr.* (1803) 64. — *P. alternifolium* Pall. *Ind. taur.* (1796) (nomen). — *Petrosimonia oppositifolia* Litw. in *Sched. ad Herb. Fl. Ross.* VII (1911) 13; Kryl., *Fl. Zap. Sib.* IV, 968. — Ic.: Pall. *Illustr. t.* 55. — Exs.: HFR no. 2037 et 2038.

Annual, 5—40 cm high, mostly erect, branched, often reddish or yellowish-green; branches at first appressed-hairy, becoming glabrous, the lower opposite, the upper alternate; leaves linear-terete, fleshy, dilated at base, becoming progressively shorter up the stem, the lower opposite, the upper alternate; bracts strongly dilated in lower part, the uppermost ovate to orbicular, shorter than flower; bracteoles constricted and laterally gibbous, about equaling the flower; perianth segments 2, acuminate, glabrous, cartilaginous in fruit; stamens 5; appendages of anthers scarious, 3-toothed or rarely 2-toothed, the lateral teeth mostly larger than the central or rarely all equal; stigmas in fruit as long as style. July—September.

Solonchak and solonetz soils; growing in groups. — European part: Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., E. Transc.; W. Siberia: U. Tob. (S.), Irt. (S.); Centr. Asia: Ar.-Casp. Gen. distr.: Bal.-As. Min. (Dobruja). Described from the vicinity of the city of Gur'ev. Type in Leningrad.

Note. Although, in accordance with priority rules, this plant should be called *P. oppositifolia* Litw., we are obliged to reject this name,* since it imparts completely wrong information concerning the plant and is conducive to misunderstandings.

Economic importance. The plant is of importance as fall and winter forage for camels and sheep. Analysis of fruiting plants from West Kazakhstan (Gur'ev area) gave the following percentage composition for air-dry weight: hygroscopic water 14.83, ash 17.98—21.10, cellulose 10.32—12.11, crude protein 4.10—4.81, crude fat 2.64—3.10, nitrogen-free extract 50.15—58.88; starch equivalent 25.41—28.85. Following pre-soaking, the composition was: hygroscopic water 14.12, ash 16.92—19.70, cellulose 11.54—13.44, crude protein 4.08—4.75, crude fat 2.75—3.20, nitrogen-free extract 50.59—58.91; starch equivalent 25.65—30.02 (I. Larin). In young northern-littoral (Caspian) specimens, ash content amounted to 30% of air-dry weight, of which 60.25% was water-soluble and contained K_2SO_4 9.4579 g, Na_2SO_4 0.3912, NaCl 38.3229, Na_2CO_3 11.2272. In old specimens the ash content was only 7.6%, with 63.5% water-soluble and containing K_2SO_4 8.2248, Na_2SO_4 13.1578, NaCl 28.2022, Na_2CO_3 7.1258, free sodium bicarbonate 3.7610 (Goebel).

5. *P. glaucescens* (Bge.) Iljin in *Mat. Komiss. eksp. issl. Akad. Nauk*, No. 26 (1930) 280; Il'in in *Fl. Yugo-Vost.* IV (1930) 233. — *Polycnemum glaucum* Pall. (partim) *Illustr.* (1803) tab. 53. — *Petrosimonia glauca*

* This species should be named *P. oppositifolia* (Pall.) Litw. — Editors.



PLATE XVI. 1. *Gamanthus kelifi* Eug.Kor.: fruiting branch.— 2. *G. pilosus* (Pall.) Bge.: fruiting branch.— 3. *Halanthium rariflorum* C.Koch: a) flowering branch, b) stamen, c) fragment of fruiting branch.— 4. *Petrosimonia triandra* (Pall.) Simonkai: a) branch, b) fruit with bract.— 5. *P. monandra* (Pall.) Bge.: a) fruiting branch, b) stamen, c) fruit with bracteoles.— 6. *P. hirsutissima* (Bge.) Iljin: a) habit, b) stamens.

auct. ross. plus. (non Pall.). — *P. crassifolia* var. *glaucescens* Bge. Anab. rev. (1862) 56. — *P. crassifolia* var. *gracilis* Bge., l. c., 57. — Ic.: Pall., l. c., t. 53; Fl. Yugo-Vost. IV, ill. 291.

Annual, 5–30 cm high, glaucous, covered throughout with subappressed or slightly spreading hairs, branching from the base; lower branches mostly ascending, long; leaves alternate, except the lowermost, linear, thickish; bracts dilated at base, surpassing the flowers, these crowded on abbreviated branchlets; bracteoles about the length of the flower, terminating in a straight or recurved nongibbous tip bearing a tuft of hairs; perianth segments 2, acuminate, broad at base, cartilaginous in fruit, dorsally fimbriate at summit; stamens 5, the scarious appendages with 3 mostly equal teeth; stigmas 1.5–2 times the length of style. June–September.

Solonchak and solonetz soils. — European part: L. V.; Caucasus: Cisc., Dag., E. Transc.; Centr. Asia: Ar.-Casp., Balkh. Endemic. Reported by the authority as var. *glaucescens* Bge. for the area between the Volga and Irtysh rivers. Type in Leningrad.

6. *P. brachyphylla* (Bge.) Iljin in Mat. Komiss. eksp. issl. Akad. Nauk, No. 26 (1930) 282. — *P. crassifolia* var. *brachyphylla* Bge. Anab. rev. (1862) 56. — Ic.: Iljin, l. c., p. 283, fig. 2 and Fl. Yugo-Vost. IV, ill. 291, fig. A.

Annual, 10–30 cm high, glaucous, appressed-hairy or glabrate, branched from base, with mostly ascending stems and lower branches; leaves alternate except the lowermost, linear-terete, very succulent; bracts navicular, slightly thickened, minutely mucronulate, longer than and almost completely enveloping the bracteoles and flowers except the very tips; flowers from the base of stem, solitary; bracteoles attenuate toward apex; perianth segments 2, acute and long-ciliate at apex, the broad lower part cartilaginous in fruit; stamens 5; appendages of anthers scarious, 3-toothed; stigmas 2–3 times the length of style. July–September.

Solonchak and solonetz soils; growing in groups. — European part: L. V. (rare); Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from the Chu River. Type in Leningrad.

7. *P. hirsutissima* (Bge.) Iljin in Acta Inst. Bot. Ac. Sc. URSS, sér. 1, II (1936). — *P. crassifolia* var. *hirsutissima* Bge. Anab. rev. (1862) 57.

Annual, 10–40 cm high, densely clothed with spreading articulate hairs particularly long in young specimens, branching from the base; branches alternate except the lowermost; leaves filiform, semiterete, acute, very slightly dilated at base, slightly channeled above, covered with spreading hairs and terminating in a tuft of hairs; bracteoles ovate, navicular, hairy, clearly surpassing the perianth, terminating in a green tip, this at first straight, becoming arched-recurved; perianth segments 2, ciliate at apex, the broad lower part cartilaginous in fruit; stamens 5; appendages of anthers 3-toothed, the middle tooth larger than the lateral ones; stigmas twice the length of style. June–July. (Plate XVI, Figure 6a–b).

Puffy gypseous solonchaks; growing in groups. — Centr. Asia: Ar.-Casp. (E.), Balkh. (W.). Endemic. Described from the Chu River. Type in Leningrad.

Note. This species covers a rather restricted range, chiefly in the area of the Sary-su and Chu rivers, characterized by gypsiferous Tertiary clays, in association with gypseous solonchaks.

8. *P. glauca* (Pall.) Bge. *Anabas. rev.* (1862) 58. — *Halimocnemis glauca* β *pentandra* Fenzl in Ldb. *Fl. Ross.* III, 2 (1851) 840 (p. p.). — *Polycnemonum glaucum* Pall. *Illustr.* (1803) 63 (p. p.). — *Petrosimonia pallasii* Iljin in herb. *Inst. Bot. Ac. URSS.* — *Icon.:* Pall. *Illustr. t.* 54 (non 53). — *Exs.:* HFR no. 283.

Annual, 5 — 30 cm high, glaucous, densely appressed-hairy; lower branches and leaves opposite, the upper alternate; leaves semiterete, flat above, gradually dilated toward base, shortly decurrent, acuminate, falcately recurved, bearing in their axils reduced closely leafy subcapitate flowering branchlets, except for the deciduous alternate lowermost; bracteoles navicular, carinate, hairy, with a straight or very slightly recurved green tip, somewhat longer than perianth; perianth segments 5, hairy above, ciliate-tipped, the 2 or 3 outer broader, oblong-oval, cartilaginous in fruit, the 2 or 3 inner narrower, remaining soft; stamens 5; appendages of anthers 3-toothed, the middle tooth larger than the lateral ones; stigmas 1.5 — 2 times as long as style. June — August.

Solonchaks and schistose gypsiferous solonchak slopes. — Caucasus: S. Transc.; Centr. Asia: Kara K., Mtn. Turkm. Gen. distr.: Arm.-Kurd., Iran. Described from the coast of the Caspian Sea. Type in Leningrad.

325 Note. The original specimen of Pallas lacks any precise indication of locality and is merely marked "a Sarpam in viarum trituras squalidis," while in his *Illustr.* it is noted that the plant reaches southward to Astrakhan. Bunge already ascertained that the record is erroneous; the Pallas collection was evidently concerned with Transcaucasian locations.

9. *P. squarrosa* (Schrenk) Bge. *Anab. rev.* (1862) 57; Kryl., *Fl. Zap. Sib.* IV, 972. — *Halimocnemis squarrosa* Schrenk in *Bull. phys.-math. Acad. Pétersb.* I (1843) 360; Fenzl in Ldb. *Fl. Ross.* III, 2 (1851) 841.

Annual, 10 — 30 cm high, profusely branched from the base, densely clothed with more or less appressed hairs; lower branches opposite, sometimes well up the stem; uppermost branches and leaves alternate; leaves terete, gradually dilated toward base and channeled in lower part, fleshy in upper part, acuminate, falcately recurved, the abbreviated flowering branchlets in the axils more crowded in the upper part of the plant; bracteoles very slightly surpassing the flower, ovate, navicular, herbaceous-green on the back and at tip; perianth segments 3, oblong, acute, densely fringed on the back and at summit; stamens 5, rarely some very small and nonfunctional; appendages of anthers small, 2-toothed, very rarely obsoletely 3-toothed; stigmas about as long as style. June — August.

Solonchaks. — Caucasus: S. Transc.; Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from the Chu River. Type in Leningrad.

Note. This species may possibly be a hybrid between *P. brachiata* or *P. sibirica* and *P. glaucescens* or *P. brachyphylla*.

Section 3. *BRACHYPHYLLON* Iljin (= 3 *Pentandrae oppositifoliae* Bge. *Anabas. rev.* (1862) 59). — Stamens 5, the anther appendages not fused; perianth segments 5; all leaves opposite.

10. *P. brachiata* (Pall.) Bge. *Anabas. rev.* (1862) 59; Shmal'g., *Fl.* II, 385; Kryl., *Fl. Zap. Sib.* IV, 971; Il'in in *Fl. Yugo-Vost.* IV, 232. — *Poly-*

cnemum brachiatum Pall. Illustr. (1803) 62. — *Halimocnemis brachiata* C. A. M. in Ldb. Fl. Alt. I (1829) 381; Fenzl in Ldb. Fl. Ross. III, 2 (1851) 842. — *H. hohenackeri* Presl. Bot. Bemerk. (1844) 109. — *Polycnemum conjugatum* M. B. in herb. et Fenzl in Ldb. Fl. Ross. III, 843. — *Anabasis conjugata* Hofm. hort. Mosq. (1808) no. 184. — Ic.: Pall., l. c., t. 52. — Exs.: HFR no. 3088.

326 Annual, 5—40 cm high, appressed-hairy, branching from the base; leaves all opposite, linear, semiterete, very slightly dilated at base; flowers borne on reduced branchlets; bracteoles ovate, navicular, acuminate, with a recurved herbaceous tip, equaling or slightly surpassing the perianth; perianth segments 5, acuminate, hairy on the back at summit, the strongly dilated lower part cartilaginous in fruit and separated from the upper part by a narrow transversal fold; stamens 5; appendages of anthers commonly 3-toothed, the middle tooth always longer than the lateral ones; stigmas as long as style. June—September.

Solonchaks, more rarely solonetz soils; growing in groups, often of considerable size.—European part: Bl., Crim., Transv. (S.), L.V.; Caucasus: Cisc., Dag., E. Transc.; W. Siberia: U. Tob. (W.); Centr. Asia: from deserts adjacent to the Caspian Sea and from the Black Sea area. Type in London.

Economic importance. Good fall forage for camels (I. Larin).

11. *P. sibirica* (Pall.) Bge. Anab. rev. (1862) 60; Kryl., Fl. Zap. Sib. IV (1930) 968. — *Polycnemum sibiricum* Pall. Illustr. (1803) 61. — *Halimocnemis sibirica* C. A. M. in Ldb. Fl. Alt. I (1829) 382; Fenzl in Ldb. Fl. Ross. III, 2 (1851) 842. — Ic.: Pall., l. c., t. 51.

Annual, 10—50 cm high, covered with mostly long spreading denticulate or more rarely appressed hairs (f. *bungeana* Serg. in Animadv. Syst. ex Herb. univ. Tomsk. No. 2 (1930)) or almost glabrous (f. *glaberrima* Korsh.); all branches and leaves strictly opposite; leaves filiform, semiterete, acuminate, very slightly dilated at base, spreading, relatively long; bracteoles navicular, with slender recurved tip, slightly surpassing the perianth; perianth segments 5, oblong or lanceolate, fringed at apex; stamens 5; anthers free, with mostly 2-toothed appendage; stigmas about the length of style. June—July.

Solonchaks. — W. Siberia: Irt., Alt. (SW); Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D., Amu D. Gen. distr.: Dzu.-Kash., Mong. Described from Siberia: "a Samyscheva usque supra Semipalatnaja." Type in London.

Economic importance. The plant provides fall forage for camels (I. Larin). Analysis of fruiting specimens from the Talas-Susamyr District of Kirghizia gave the following percentage composition: hygroscopic water 6.34, ash 28.05, cellulose 16.42, crude protein 7.45, crude fat 2.35, nitrogen-free extract 39.39 (Abolin and Sovetkina, under the name *P. brachiata* Bge.).

327

Genus 439. **HALOCHARIS*** MOQ.

Moq. in DC. Prodr. XIII, 2 (1849) 201 (p. p.); Bge. Anab. rev. (1862) 61.

Flowers perfect, with a pair of lateral bracteoles; perianth 5-merous, with a tuft of long hairs at base, the free segments unchanged in fruit; stems with long filaments and oblong appendiculate anthers; stigmas 2, filiform, borne on a style; fruit vertical in a transversal plane, strongly

* From Greek *hals*, salt, and *charis*, beauty, grace.

compressed, with scarious glabrous smooth pericarp; seeds exalbuminous, with spiral embryo. Annual plants, always profusely hairy; leaves alternate, filiform or linear, terminating in divergent articulate bristles. The genus contains 6 species.

1. Flowers together with bracteoles wrapped in cottonwool-like implexed hairs; appendages of anthers pale, often rosy-tinged 3. *H. lachnantha* Eug. Kor.
- + Flowers and bracteoles covered with spreading hairs; appendages of anthers bright yellow 2.
2. Main stem always developed; flowers forming distinct spiciform inflorescences at the ends of stems and branches; bracts longer than flowers; anther locules free only for one-fourth to one-half their length; appendages ovate, obtuse, less than half the length of anther 2. *H. turcomanica* Iljin.
- + Main stem not developed; flowers not forming spiciform inflorescences; bracts about as long as or shorter than flowers; anther locules free up to the appendage; appendages lanceolate or linear-ovate, acuminate, as long as or in any case not less than half the length of anther 1. *H. hispida* (C. A. M.) Bge.

1. *H. hispida* (C. A. M.) Bge. Anabas. rev. (1862) 62; Boiss. Fl. Or. IV, 974. — *Halimocnemis hispida* C. A. M. in Bull. phys.-math. Acad. Pétersb. I (1843) 360; Fenzl in Ldb. Fl. Ross. III, 844. — Ic.: Sornye rast. SSSR, II, fig. 130. — Exs.: HFR no. 336; H. F. A. M. V, no. 118.

328 Annual, 5–30 (50) cm high, glaucescent, bushy-branched from the base, with elongated opposite approximate lower branches and mostly undeveloped main stem; stems and branches covered with short hairs; leaves filiform, terete, obtusish, the lowermost 8–15 (20) mm long, flat, to 2 mm broad, soon wilting, the upper mostly 2–5 mm long, dilated at base, the uppermost oblong-ovate, usually shorter than flowers, all leaves covered with long articulate spreading bristles, at apex with spreading bristles and sometimes short hairs; flowers solitary; bracteoles navicular, attenuate toward apex, about as long as flower; fruiting perianth 4–6 mm long; segments oblong to oblong-oval or lanceolate, obtusely truncate or crenate, rarely subacute, in upper part glabrous, in lower part with long flexuous hairs; appendages of anthers lanceolate, yellowish, sessile, acuminate, somewhat inflated, minutely aculeate, mostly slightly shorter than or more rarely to but half as long as anther; anther locules free nearly to the appendage; stigmas filiform, nearly as long as style, rounded at tips; fruit ca. 2 mm long, with thin membranous glabrous olivaceous-brown pericarp. June–July. (Plate XIV, Figure 7a–b).

Solonchaks, wormwood solonchak and loess deserts, sandy loams and sands, old fields, pastures, and as weed in fields. — Centr. Asia: Balkh., Syr D., Kyz. K., Kara K., Mtn. Turkm., Amu D., Pam.-Al. (W.). Gen. distr.: Iran. Described from the Chu River. Type in Leningrad.

Economic importance. According to Agababyan, Granitov, and Kasimenko, the plant is readily eaten by horses, camels, and sheep. Analysis of November specimens from the Talas-Susamyr District of the Kirghiz ASSR showed the following percentage composition according to Abolin and Sovetkina: hygroscopic water 10.79, ash 8.97, cellulose 40.87, crude protein 9.26, crude fat 1.38, nitrogen-free extract 28.73.

2. *H. turcomanica* Iljin in Acta Inst. Bot. Ac. Sc. URSS, sér.2, II (1936).129.

Annual, (10) 15—50 cm high, always with a developed erect main stem, rarely simple, mostly branching from base, the stem and branches covered with slender spreading hairs; leaves filiform-linear, obtusish, commonly flat, 1—2 mm broad, the lowest to 20—25 mm long, soon wilting, progressively smaller and often thicker up the stem, all covered with spreading articulate bristles, these spreading at tips; bracts at the base of spike 6—10 mm long; flowers in short compact spikes, these in turn disposed in spiciform inflorescences at the ends of stems and branches; bracts narrowly linear, but slightly dilated at base, somewhat recurved, always distinctly longer than flowers and bracteoles; bracteoles narrowly lanceolate, carinate, attenuate and thickened at summit, obtusish, slightly surpassing the perianth; perianth segments thin, membranous, oblong, ca. 3 mm long, obtuse or truncate and crenate, covered on the back and on the margin with long flexuous hairs and with a dense tuft of such hairs at base; anthers oblong, ca. 2 mm long, appendiculate; appendage ovate, obtuse or rarely subacute, sessile, yellowish, scabrous-aculeate, mostly one-sixth to one-third to rarely half as long as the anther; anther locules free mostly for one-fourth to two-fifths and never more than half their length; stigmas filiform, 1—1.5 mm long, rounded at tips, as long as or but slightly shorter or longer than the filiform style; fruit rounded-oval, ca. 1.5 mm in diameter. Fl. April—May; fr. May—August.

Sandy and saline desert soils. — Centr. Asia: Kara K. (SE). Endemic; probably occurring in Afghanistan. Described from the vicinity of Chervyak station in the Murgab River valley. Type in Leningrad.

3. *H. lachnantha* Eug. Kor. in Addenda V, p. 668.

Annual, 5—20 cm high, divided at the base into branches of equal length, hence the plant apparently many-stemmed, elsewhere stems simple or short-branched; hairs on stems rather sparse, spreading, often almost none, in upper part slightly crisp; leaves narrowly linear, subterete; lower leaves in subsequently wilting rosette, sessile, obtuse, with few fugacious articulate bristles at the subclavately enlarged apex, glabrate or with few soft spreading fugacious hairs, the basal more densely covered with persistent hairs, 10—25 mm long; bracts leaflike, surpassing the somewhat broader bracteoles, these about equaling the flowers; flowers densely enveloped in a cottonwool-like coating of soft implexed hairs; perianth segments membranous, oblong to oblong-oval, obtusely truncate and crenate at apex, densely covered on the back with long hairs; anthers with locules separated to one-fourth to half their length; appendage oblong-ovate, somewhat obtusish, sharply scabrous, pale, often rosy-tinged, much shorter than the anther; stigmas filiform, as long as or somewhat longer than the style. April.

Saline hollows among sands. — Centr. Asia: Kara K. Endemic. Described from a location between Charyshly well and Ekizen. Type in Tashkent.

Genus 440. **HALIMOCNEMIS** * C. A. M.

C. A. M. in Ldb. Fl. Alt. I (1829) 381.

Flowers axillary, solitary, perfect, 5-merous, rarely 4-merous; bracteoles herbaceous, leaflike; perianth segments lanceolate, mostly

* From Greek *halimos*, saline, and *cnemis*, shank.

- 330 hairy, at first membranous, in fruit indurated and united in lower part into an ampullaceous structure; stamens 5, more rarely 4; filaments long; anthers linear, appendiculate; appendages variously shaped, mostly yellow; lobes of the hypogynous disk [staminodes] none; stigmas 2, short or long, semiinfundibular at tips and often denticulate; seeds vertical, with spiral embryo, covered by a succulent pericarp. Annual succulent plants; leaves alternate, terete, terminating in a short conical spine, mostly hairy. The genus contains about 12 species.
1. Perianth segments and stamens 4 each 2.
 - + Perianth segments and stamens 5 each, more rarely perianth segments 4 by fusion, but stamens invariably 5 3.
 2. Fruiting plants glabrous; bracts arcuately upcurved; perianth segments hairy in lower or middle part, in mature fruit either quite glabrous or hairy at the middle and glabrous below 2. *H. sclerosperma* (Pall.) C. A. M.
 - + Fruiting plants hairy; perianth segments hairy throughout, the hairs persistent on the lower part of fruit 3. *H. villosa* Kar. et Kir.
 3. Bracts suborbicular, rounded at apex, shorter than bracteoles, these resembling the bracts and much shorter than perianth 1. *H. karelini* Moq.
 - + Bracts always cuspidate, narrow, always surpassing both bracteoles and perianth 4.
 4. Perianth quite glabrous, especially in fruit, or with hairs confined to collar, often obnapiform 10. *H. smirnowii* Bge.
 - + Perianth always hairy or, exceptionally, glabrous at base and then the whole plant glabrous or nearly so 5.
 5. Perianth segments covered with implexed hairs 6.
 - + Perianth segments covered with appressed upright hairs 7.
 6. Anthers 5—6 mm long, with appendage 3—3.5 mm long; stigmas one-third to half as long as style; perianth ca. 10 mm long, the narrow free upper part about as long in fruit as the enlarged united lower part 9. *H. macranthera* Bge.
 - + Anthers 3—3.5 mm long, with appendage 1—1.25 mm long; stigmas 2.5—5 times as long as style; perianth 6—7 mm long, the narrow free upper part much shorter in fruit than the lower . . . 8. *H. lasiantha* Iljin.
 7. Plants quite glabrous, especially in fruit, or more rarely the lowest internode hairy 7. *H. glaberrima* Iljin.
 - + Plants always hairy throughout 8.
 - 331 8. Plants covered only with short appressed silky hairs; leaves flat, 4—6 mm broad, the lowermost to 10 mm broad . . . 11. *H. latifolia* Iljin.
 - + Plants covered with short mostly spreading hairs and long articulate bristles; leaves mostly narrower 9.
 9. Plants covered, beside short hairs, with very long dense silky hairs, these subsequently somewhat rufescent; stigmas much longer than style; fruiting perianth rounded at bottom 6. *H. mollissima* Bge.
 - + Long hairs merely scattered among the short lining, neither soft nor silky; stigmas shorter than style; fruiting perianth squarely truncate at bottom 10.
 10. Anthers not less than 5 mm long, with rounded-oval appendage; perianth 7.5—10 mm long, the free columnar upper part about as long in fruit as the enlarged united lower part 5. *H. beresini* Iljin.

+ Anthers 1—2.5 mm long, with oblong appendage; perianth 5—6.5 mm long, the upper part shorter in fruit than the lower. 4. *H. longifolia* Bge.

1. *H. karelini* Moq. in DC. Prodr. XIII, 2 (1849) 196; Fenzl in Ldb. Fl. Ross. III, 846; Boiss. Fl. Or. IV, 976; Bge. Anabas. rev. (1862) 67. — *H. karelini* var. *canescens* Pauls. in Vidensk. Meddel. fra den naturh. Foren in Kbhvn, (1903) 203.

Annual, 3—20 cm high, intensely glaucous to almost bluish; profusely branching from the base, at first rather densely covered with short spreading hairs, finally quite glabrous; leaves succulent, semiterete, obtuse, the lowest opposite, 20—30 mm long, the middle alternate, 6—15 mm long, all soon wilting; bracts almost semiorbicular or rounded-ovate, convexo-concave, terminating in a brown acutish tip, narrowly hyaline-margined, 2—4 mm long, much shorter than the similar rounded-oval bracteoles, these enveloping and, especially in fruit, much shorter than the perianth; perianth segments 5, membranous, lanceolate, glabrous, acuminate, 4—5 mm long, elongating in fruit to 7—10 mm, two of them usually becoming somewhat cartilaginous in lower part which acquires a spoonlike shape, densely covered on the back with small warts, enveloping the other segments, abruptly passing into the narrowly linear upper part, this exerted from the bracteoles; stamens 5; anthers 1.5—2.5 mm long, with locules free to between one-third and two-thirds; appendage ovate or lanceolate, obtusish, subsessile, rounded at base, whitish, 0.75—1.5 mm long; stigmas two-thirds as long as the broad flat style; fruit oval, rigid, 1.5—2 mm long. May—June. (Plate XVII, Figure 6).

Salinas, takyrs, puffy solonchaks, solonetz soils, gypseous clays, and clayey solonchak deserts; growing in groups. — Centr. Asia: Ar.-Casp., Balkh. (rare), Kyz. K., Endemic. Described from the Ural River area and from Lake El'ton. Type in London.

Economic importance. In fall the plant provides fattening feed for camels. Analysis of fruiting plants from Ust-Urt gave the following percentage composition on dry weight basis: hygroscopic water 6.52, ash 41.20—44.07, cellulose 5.49—5.87, crude protein 7.06—7.56, albumin 4.30—4.62, crude fat 1.44—1.54, nitrogen-free extract 38.29—40.96; starch equivalent 27.08—28.99 (I. Larin).

2. *H. sclerosperma* (Pall.) C. A. M. in Ldb. Fl. Alt. I (1829) 387; Fenzl in Ldb. Fl. Ross. III, 847; Bge. Anabas. rev. (1862) 66; Shmal'g., Fl. II, 386; Il'in in Fl. Yugo-Vost. IV, 237. — *H. villosa* A. Beck. et auct. europ., non Kar. et Kir. — *Polycnemum sclerospermum* Pall. It. III (1776) 725 (nomen); Illustr. (1803) 65. — *P. nuciferum* Pall. It. III (1776) 635 (nomen). — Ic.: Pall. Illustr., t. 56; Fl., Yugo-Vost. IV, ill. 293.

Annual, 3—20 cm high, densely covered when young with short simple as well as long articulate hairs, later glabrous or nearly so, divaricately branched from base; leaves alternate, semiterete, fleshy, 10—50 mm long, very slightly dilated and clasping at base, terminating in a short hard prickle; flowers solitary, shorter than bracts; bracteoles navicular, attenuate toward apex and spiny-tipped, slightly surpassing the flower; perianth 5—9 mm long; segments 4 or rarely 3 by fusion, lanceolate,

acuminate, united close to base, woolly on the back in lower part or very rarely up to the summit, extremely rarely glabrate; fruiting perianth ampullaceous, easily separating from the caducous bracteoles; stamens 4; anthers 1—1.5 mm long, with locules free for one-fifth to one-third their length; appendages lanceolate or oval-oblong, white, bladdery, 1.3—2 mm long, acutish, broadest near base or at the middle, rounded at base, sessile, 1.5—2 times as long as or rarely the length of the style; fruit oval, ca. 3.5 mm long. June—September. (Plate XVII, Figure 4).

Solonetz soils, wormwood associations with *Anabasis salsa* and with *Salsola arbuscula* in solonetz deserts, puffy solonchaks, salinas, and takyrs. — European part: L. V.; Caucasus: E. Transc.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K. Endemic. Described from the area of the Ural River and Lake El'ton. Type in London.

333 Economic importance. The plant provides fattening feed for camels. Analysis of whole fruiting plants from (2 samples) from Ust-Urt gave the following percentage air-dry weight composition: hygroscopic water 5.17, 7.27; ash 31.96—33.70, 28.53—30.77; cellulose 6.90—7.28, 5.91—6.37; crude protein 6.11—6.44, 7.24—7.81; albumin (for first sample only) 4.09—4.31; amides (same) 0.12—0.13; crude fat 2.07—2.18, 2.54—2.74; nitrogen-free extract 47.79—50.40, 48.51—52.31; starch equivalent 33.04—34.85, 34.27—36.98 (I. Larin).

3. *H. villosa* Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 434; Bge. *Anabas. rev.* (1862) 69; Fenzl in Ldb. Fl. Ross. III, 847; Boiss. Fl. Or. IV, 977.

Annual, 3—25 cm high, glaucous, branched from the base, densely covered with short spreading hairs and with scattered longer articulate hairs; leaves narrowly linear, 20—30 mm long and 1—2 mm broad (2.5 at base), the lower 40—50 mm long, convex beneath, in lower part with distinct broad whitish decurrent keel, flat or slightly channeled above, concave in lower part, dilated and half-clasping at base, acuminate and terminating in a short cartilaginous prickle 2—3 mm long, more or less spreading and often recurved at the tip; bracts 15—25 mm long, surpassing the bracteoles, these narrowly linear and barely longer than flower; perianth segments 4, membranous, lanceolate, 4—6 mm long, mucronate, hairy on the back, with a tooth on either side of the sometimes obsolescent mucro; fruiting perianth ampullaceous, with rounded-oval lower part, 4—6 mm long and 3—4.5 mm in diameter, the rounded bottom surrounded by a ridge 1.5—2 (2.5) mm in diameter and a convex cross at center, the neck 3—4 mm long; stamens 4; anthers 2—3 mm long, with locules separated up to the middle or slightly less; appendage oblong-ovate to suboblong, borne on a very short stipe, whitish-creamy or pale yellow, 1—1.5 mm long and ca. 0.5 mm in diameter; stigmas enlarged at tips, mostly 2—4 mm long, much longer than style, this commonly 1—2 mm long; very rarely stigmas shorter. (Plate XVII, Figure 2a—b).

Clayey and gravelly-argillaceous solonchak desert-steppes, also puffy solonchaks. — Centr. Asia: Ar.-Casp. (rare), Balkh., Kyz. K., Syr D. (rare). Gen. distr.: Dzu.-Kash. (Kuldja). Described from a location on the Kanchaka rivulet between the Lepsa River and the Agratinskii Mountains. Type in Leningrad.

Economic importance. Fattening forage for camels (I. Larin).

4. *H. longifolia* Bge. in A. H. P. VI, 2 (1880) 447 in adnot. — Minkw. in O. et B. Fedtsch. Consp. Fl. Turkest. VI (1916) 260.

334 Annual, 5—30 cm high, glaucous, branched from base, densely covered throughout with short spreading hairs interspersed with long articulate bristles; leaves narrowly linear, 15—30 mm long, the lowermost to 60 mm long, thickish, 1.5—2 mm broad, terminating in spine 1.5—3 mm long, at first flattish above, channeled in lower part, convex beneath, gradually dilated and keeled at base, spreading; bracteoles resembling but shorter than the bracts, slightly longer than flower, separating from the fruit with difficulty; perianth segments 5, lanceolate, membranous, appressed-lanate on the back, mucronate (the mucro situated between two lobules); fruiting perianth bottle-shaped, at bottom 4—6.5 mm in diameter, the lower enlarged part 4.5—6 mm, the narrow upper part 3—4 mm long; stamens 5; anthers 1—2.5 mm long, with locules separated to between one-fourth and one-third, appendage oblong, acutish, yellow, obsoletely stipitate, 1—2 mm long and 0.5—0.75 mm in diameter, about as long as anther; stigmas strongly enlarged and crenate at tips, one-third to half as long as the style, together with it 3—4 mm long. May—July. (Plate XVII, Figure 3a, b).

Low friable sandhills, takyrs and solonchaks covered with sand deposits, and loess foothill soils. — Centr. Asia: Ar.-Casp. (rare), Balkh. (rare), Kyz. K., Syr D., Kara K. Endemic. Described from the vicinity of Tashkent. Type in Leningrad.

5. *H. beresini* Iljin in Acta Inst. Bot. Ac. Sc. URSS, sér. 1, III (1936).

Annual, 10—30 cm high, glaucous, branched from base, covered with short spreading hairs as well as long articulate bristles; leaves narrowly linear, half-clasping, 15—40 mm long and 2—3 mm broad, flat above, channeled near base, convexly keeled beneath, terminating in a spine 1—3 mm long; bracts and the shorter bracteoles prominently carinate; fruiting perianth mostly scarcely surpassing the bracteoles; perianth segments 5, lanceolate, membranous, acuminate, 7.5—10 mm long, appressed-lanate on the back, mucronate, often with lobules on each side of the mucro; fruiting perianth bottle-shaped, with bottom 4—5 mm in diameter, the lower part 5—6 mm, the upper 5—6.5 mm long; stamens 5; anthers 5—5.5 mm long, the locules separated nearly to the middle; appendage oval or globular-oval, yellow, obsoletely stipitate, 2—2.5 mm long and 1.5—2 mm broad; stigmas semiinfundibular and crenate at tips, 1—1.5 mm long, one-fourth to half as long as the thickish style. June.

Sandy-argillaceous and saline argillaceous deserts. — Centr. Asia: Kara K., Amu D. Endemic. Described from the Ish-kak area in the SE Kara-Kum Desert. Type in Leningrad.

6. *H. mollissima* Bge. Anabas. rev. (1862) 71; Bge. in A. H. P. VI, 2 (1880) 447; Boiss. Fl. Or. IV, 977. — Exs.: HFR no. 335; Sintenis It. transcasp.-pers. 1900—1901, no. 986.

335 Annual, 15—30 cm high, glaucous, subdivaricately branched from the base, covered with long soft silky hairs, densely at first, more sparingly in fruit; less often with very long articulate straight spreading hairs and a dense lining of short hairs; leaves thickish, narrowly linear, 25—40 mm long, the lower to 50—80 mm long, 2—3 mm broad, slightly dilated at base, ca. 3—5 mm

broad, half-clasping, convex and keeled beneath, almost flat above, in lower part deeply channeled, terminating in a short spiny cartilaginous hairy cusp ca. 1—3 mm long, spreading and mostly scarcely recurved; bracts leaflike, ca. 25 mm long, surpassing the bracteoles; bracteoles lanceolate, spiny-tipped, sharply carinate, about equaling or very slightly surpassing the perianth, falling in fruit together with perianth; perianth segments 5, narrowly lanceolate, 10—12 mm long, acuminate, often with a scarious tooth on each side of the mucro, appressed-hairy on the back; fruiting perianth ampullaceous, 12—16 mm long, with bottom 2—3 mm in diameter, the oval lower part 6—8 mm long and 4—5 mm in diameter, the neck 6—8 mm long; anthers 3—3.5 mm long, the locules separated to one-third; appendage yellow or orange, oblong, ca. 2.5—3 mm long, acutish, with a very short stipe; stigmas enlarged at tips, 3—3.5 mm long, the style 0.5—2 mm long. June—July.

Solonchaks, takyrs, and argillaceous-saline deserts. — Centr. Asia: Kyz. K. (S.), Kara K. (SE), Mtn. Turkm., Syr D., Amu D. Gen. distr.: Iran. Described from Mt. Tabat-kuh near Meshed in NE Iran. Type in Paris; cotype in Leningrad.

Economic importance. According to Agababyan, Granitov, and Kasimenko, the plant provides fattening fall and winter forage for camels and sheep.

7. *H. glaberrima* Iljin in Acta Inst. Bot. Ac. Sc. URSS, sér. 1, II (1936) 130.

336 Annual, 15—30 cm high, glaucous, glabrous, apparently hairy only when very young, already at the flowering stage hairs confined to the lowest internode and subsequently disappearing; stems erect, branched, the branches erect; leaves narrowly linear, fleshy, convex beneath, channeled above, arched-recurved at least at tips, terminating in a short rigid cusp, the middle cauline ca. 25—30 mm long, the lowermost longer; bracts more dilated at base, surpassing the bracteoles, these lanceolate, carinate, concave on the inside, slightly reflexed at tips, mucronate, as long as or longer than perianth; perianth segments lanceolate, membranous, 6.5—9 mm long, hairy on the back up to the summit; fruiting perianth ampullaceous; stamens 5; anthers ca. 4—4.5 mm long, the locules separated up to the middle; appendage yellow, oval to oblong-oval, subsessile, bladderly, mostly about half as long as the anther; stigmas slightly enlarged at tips, two-thirds as long as style and together with it 5—6 mm long; fruit round, ca. 2 mm in diameter. May—June.

Sand-and-pebble deserts. — Centr. Asia: Amu D. Gen. distr.: most probably occurring in Afghanistan. Described from Kelif. Type in Leningrad.

8. *H. lasiantha* Iljin in Acta Inst. Bot. Ac. Sc. URSS, sér. 1, III (1936).

Annual, 5—25 cm high, intensely glaucous, branched from the base, woolly with very short spreading hairs interspersed, especially at the margins, with long articulate bristles; leaves narrowly linear, 20—40 mm long, the lowermost to 50—60 mm long, 2—2.5 mm broad, thickish, at base somewhat dilated and on the underside convex with decurrent keel, flat above except for the channeled lowest part, terminating in a spiny point 2—3 mm long; bracts surpassing the bracteoles, these resembling the

bracts and slightly longer than flower; perianth segments 5, membranous, lanceolate, 6—7 mm long, the spine seated in a notch and covered with tangled hairs; fruiting perianth conical, 5.5—7 mm long and 4—6 mm in diameter at bottom, the beaklike upper part 3—4 mm long and consisting of distinct unchanged perianth lobes; stamens 5; anthers 2—3.25 mm long, the locules separated up to the middle; appendage ovate or oblong-ovate, lurid, obsoletely stipitate, 1—1.25 mm long; stigmas infundibular at the flabellately enlarged tip, crenulate at summit, 2.5—5 times as long as the style, together with it 3—4 mm long. June—July. (Plate XVII, Figure 7).

Stony wormwood-saltwort deserts and dry stony riverbeds. — Centr. Asia: Syr D. Endemic. Described from the vicinity of Kanibadan village in the Kokand district of Uzbekistan. Type in Leningrad.

9. *H. macranthera* Bge. Reliq. Lehm. (1851) 229; *Anabas*. rev. (1862) 70. — *H. macrantha* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 848 in adnot.

337 Annual, 5—15 cm high, intensely glaucous, branched from base, densely covered throughout with short spreading hairs interspersed, especially at the margins on the lower part of the underside, with long articulate hairs; leaves narrowly linear, thickish, 15—40 mm long and 1.5—2.5 mm broad, at the somewhat dilated base 2.5 mm broad and convex beneath, half-clasping and keeled, deeply channeled above, elsewhere flattish above, convex beneath, terminating in a prickle 2—4 mm long, spreading-recurved; bracts surpassing the bracteoles, these linear, longer than flower, separating from the mature fruit; perianth segments 5, lanceolate, acuminate, implexed-lanate on the back, forming in fruit a cone 5—6 mm long and 4—6 mm in diameter at base, in upper part free, thin, membranous, forming above the cone a beak 5—7 mm long and covered like the rest with implexed hairs; stamens 5; anthers 5—6 mm long, the locules divergent to below the middle; appendage bladdery, faintly yellowish, oval, attenuate at both ends or more rarely subcordate at base, ca. 3—3.5 mm long and 1.5—1.75 mm in diameter, often almost imperceptibly depressed at the top; stigmas enlarged at tips, one third to half as long as style, this 3—4.5 mm long. July.

Centr. Asia: Kyz. K., Amu D. (Kyzyl-tepe). Endemic. Described from the Suzus-Kara-Tau Mountains in the Aktau system and the Tamdinskii district in the S. Kyzyl-Kum Desert. Type in Leningrad.

10. *H. smirnowii* Bge. in A. H. P. VI, 2 (1880) 447 in adnot.; Minkw. in O. et B. Fedtsch. Consp. Fl. Turk. VI (1916) 260.

Annual, 5—15 cm high, branched from the base, grayish-glaucous, densely covered with short subappressed or almost spreading hairs, without any admixture of long articulate bristles; leaves linear, thickish, 15—30 mm long, the lower to 50—60 mm long and 2—3 mm broad, flattish above, convex-keeled beneath, scarcely dilated at base and slightly decurrent, terminating in a spine 1—2.5 mm long, spreading; bracts surpassing the bracteoles, these resembling the bracts and slightly longer than flower; perianth segments 5, lanceolate, 6—10 mm long, thin, membranous, obtuse, glabrous or with few scattered hairs, often notched or lacerate at apex; fruiting perianth glabrous or with hairs confined to the collar, the lower part light brown, elongate-dome-shaped or obnapiform, 5—7.5 mm in diameter, 5.5—7 mm long, the lobes in upper part free,

hyaline, forming a beak 4—6.5 mm long, this breaking easily and in very ripe fruits merely 2—3 mm long; bracteoles persistent till advanced maturity in late fall; stamens 5; anthers separated nearly up to the middle; appendage oval to oblong-oval, yellowish, subcordate at base, obsoletely stipitate, obtuse or sometimes very slightly reflexed at the tip, ca. 2.5 mm long and 1.5 mm in diameter; stigmas 4—5 mm long, scarcely enlarged at tips, 2—3 times as long as style. June—July. (Plate XVII, Figure 5).

338 Gravelly solonetz slopes and pebbles. — Centr. Asia: Kyz. K. Endemic. Described from the S. Kyzyl-Kum Desert. Type in Leningrad.

Note. Where the plant comes in contact with *H. longifolia* Bge., in sand-and-pebble deserts, hybrids (*H. smirnowii* × *H. longifolia*) are easily formed; the perianth, stamens, and stigmas are short, and perianth segments, stems, and leaves are more densely hairy, with admixture of long articulate bristles.

11. *H. latifolia* Iljin in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, II (1936) 130.

Annual, 8—25 cm high, appressed-hairy, with spreading branches from the base; stems and branches at least in upper part mostly zigzag-bent, covered with silky hairs, these subappressed in the lower and upright-appressed in upper part; leaves alternate, oblong-linear, sessile, obtusish, terminating in a very short spinule, mostly with a keellike midnerve beneath and often 2 faint lateral veins, flat or slightly channeled above, spreading, the middle cauline 20—30 mm long and 4—6 mm broad, the lowermost to 40 mm long and 6—9 mm broad, all slightly constricted near base and again dilated below; bracts always surpassing the flowers and bracteoles; bracteoles lanceolate, prominently keeled, navicular, acute, slightly shorter than perianth, in fruit as long as or slightly shorter than perianth; perianth segments 5, membranous, lanceolate, 6—8 mm long, thinner on the margin, mostly slightly notched at apex, with a short mucro in the notch, hairy throughout on the back but more densely in lower part; fruiting perianth bottle-shaped, 5—6 mm in diameter at the truncate base, the enlarged part 5—7 mm long, abruptly constricted into a beak 3.5—4.5 mm long; anthers 4—5 mm long, with anthers free to between half and two-thirds their length; appendage yellow, bladdery, oval or ovate, 2—2.5 mm long, with a very short stipe, slightly notched at the tip and often with a tubercle in the notch, broader than the anther; stigmas half to two-fifths as long as style, strongly flabellately enlarged and longitudinally folded at the tips; fruit ca. 3 mm long. May—June. (Plate XVII, Figure 8 a and b).

Clayey sandy-and-pebbly deserts. — Centr. Asia: Kyz. K. (S.), Amu D. Endemic. Described from the vicinity of Karakul' station in the lower reaches of the Zeravshan River. Type in Leningrad.

Genus 441. **HALOTIS*** BGE.

Bge. Anabas. rev. (1862) 73.

Flowers perfect, 4- or 5-merous, solitary; bracteoles lateral, rather broad, herbaceous; two outer perianth segments developing in fruit obsolescent winglike outgrowths and becoming cartilaginous in lower

* From Greek *hals*, salt, and possibly *us*, ear.

339 part, at base connate, adnate to bracteoles and falling together with them; stamens 4 or 5; filaments linear; anthers linear, exserted, with inflated obtusish appendages; lobes of hypogynous disk [staminodes] wanting; stigmas 2; fruit vertical, succulent; seeds with spiral embryo. Annual hairy plants; main stem undeveloped and replaced at base by a pair of forking branches; leaves semiterete, alternate. The genus contains 2 species.

1. *H. pilosa* (Moq.) Iljin in Acta Inst. Bot. Ac. Sc. URSS ser. I, III, (1936). — *Halimocnemis pilosa* Moq. Chenop. (1840) 152; Bge. Anabas. rev. (1862) 68. — *H. villosa* Bge. Rel. Lehm. (1851) 299 (p. p.) non Kar. et Kir. — *Halotis occulta* Litw. in Sched. ad HFR, II (1900) 26 (non Bge.); Minkw. in O. et B. Fedtsch. Consp. Fl. Turk. VI, 261. — Exs.: HFR no. 282 (sub *H. occulta*).

Annual, 5–15 cm high, divaricately branched, glaucous, usually suffused with purple, covered with dense short hairs and scattered long slender articulate bristles, these more abundant on young plants; leaves semiterete, 15–30 mm long; the lowermost soon deciduous, to 40 mm long and 1–15 mm broad, terminating in a spine 2–3 mm long, somewhat dilated toward base and slightly decurrent, straight, spreading; bracts surpassing the bracteoles and flowers; bracteoles oblong-ovate to broad-ovate, covering the perianth except at the tip, carinate and gibbous at base, slightly shorter than perianth; perianth segments 4, lanceolate, acuminate, 7–8 mm long, elongating in fruit to 15 mm, the two outer becoming strongly indurated in fruit and developing at juncture with the narrow membranous part about the middle obsolescent winglike outgrowths; stamens 4; anthers 2–3 mm long, the anthers separated up to just below the middle; appendages clavate, purple, gradually tapering down to a stipe, 2.25–3 mm long and 1–1.5 mm in diameter where broadest; stigmas filiform, obtuse, not enlarged at tips, 1.25–2 mm long, 1.5 times longer than style; seeds ca. 3 mm in diameter. June. (Plate XVII, Figure 1 a, b).

Solonchak and gravelly slopes, and takyrs. — Centr. Asia: Kyz. K. (S.), Kara K., Mtn. Turk. Gen. distr.: Iran. Described from Iran. Type in Paris.

Genus 442. **PIPTOPTERA** * BGE.

Bge. in A. H. P. V, 2 (1878) 664 et VI, 2 (1880) 448.

340 Flowers perfect, solitary in the axils, with a pair of lateral bracteoles; perianth segments 5, united at the very base, stiffish, two of them broader in fruit, navicular, distinctly 2-nerved and winged above the middle, the wing easily falling in maturity along a definite line and leaving behind a 2-lobed protuberance; the 3 narrower segments nerveless and wingless; stamens 5; anthers appendiculate; appendage narrowly conical, acuminate; stigmas 2, subulate; fruit vertical, compressed, with thin pericarp; seeds exalbuminous, with spiral embryo, the radicle pointing upward. Plants with alternate entire leaves. A monotypic genus.

* From Greek *piptos*, to fall, and *pteron*, wing.

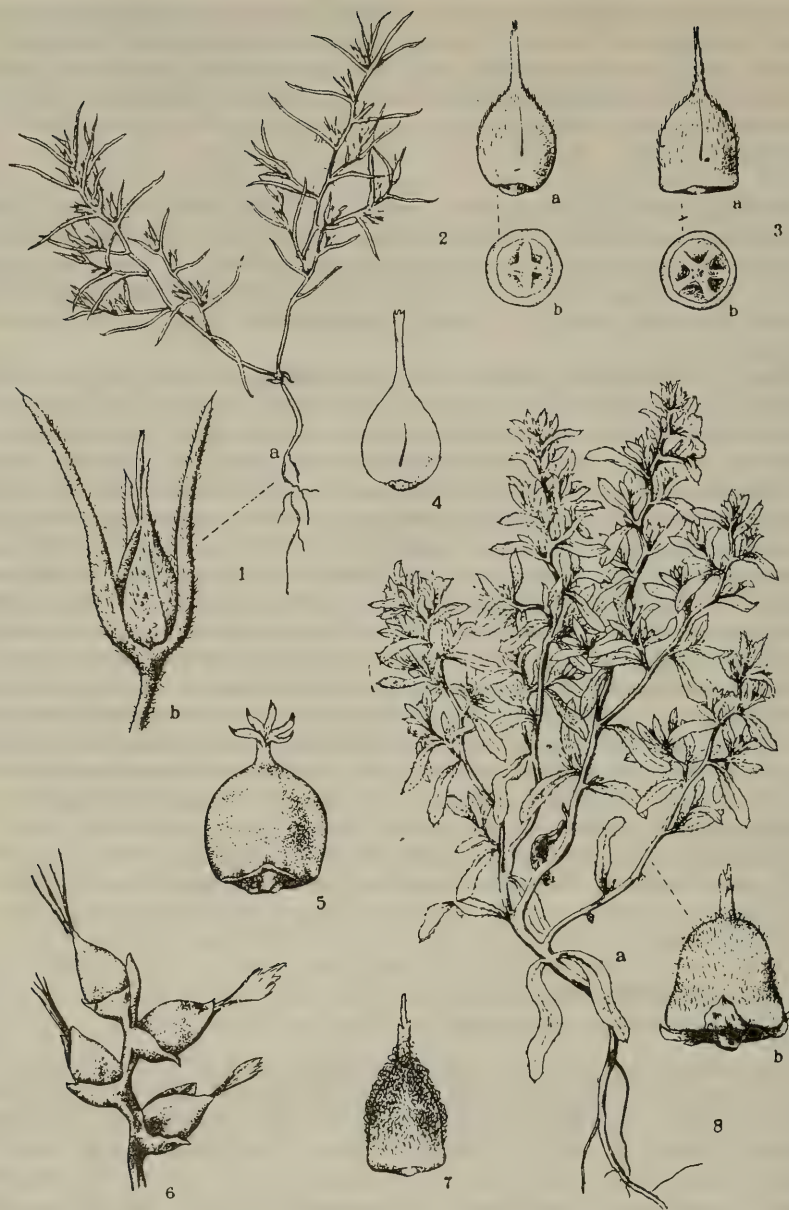


PLATE XVII. 1. *Halotis pilosa* (Moq.) Iljin: a) habit, b) flower in fruiting condition.— 2. *Halimocnemis villosa* Kar. et Kir.: a) fruit, b) fruit bottom.— 3. *H. longifolia* Bge.: a) fruit, b) fruit bottom.— 4. *H. sclerosperma* (Pall.) C.A.M.: fruit.— 5. *H. smirnovii* Bge.: fruit.— 6. *H. karelini* Moq.: fruiting branch.— 7. *H. lasiantha* Iljin: fruit.— 8. *H. latifolia* Iljin: a) habit, b) fruit.

1. *P. turkestanica* Bge. in A. H. P. V, 645 et VI, 449. — Ic.: Sornye rast. SSSR, II, p. 147, fig. 129. — Exs.: HFR no. 687.

Annual, 15—50 cm high, branched from base, covered rather densely throughout with closely appressed simple hairs; leaves fleshy, linear, subtriquetrous, scarcely dilated at base, terminating in a cartilaginous sometimes caducous cusp; bracts and bracteoles leaflike but shorter and carinate in lower part; bracteoles longer than perianth and somewhat spreading in fruit; perianth appressed-hairy, compressed laterally, prominently ribbed by the nerves of two perianth segments which envelop and cover up the others; wings of the former large, semiorbicular-reniform, semipellucid-membranous, subentire, flabellately many-nerved, overlapping; fruit surmounted by a beak; pericarp membranous, blackish-brown, easily torn especially at the top, finely elongate-reticulate and hence apparently longitudinally rugose; seeds subrotund, 2.75—4 mm in diameter, glabrous, dark brown, almost smooth or irregularly rugose, with pronounced embryo. August. (Plate XIV, Figure 4 a, b).

Solonchaks and solonchak sands. — Centr. Asia: Kara K., Kyz. K., Amu D. Endemic. Described from the vicinity of Petro-Aleksandrovsk [Turtkul'] on the Amu Darya River. Type in Leningrad.

Economic importance. A significant weed.

Genus 443. **HALANTHIUM*** C. KOCH

C. Koch in Linnaea XVII (1843) 313; Bge. Anab. rev. (1862) 80.

Flowers perfect, 5-merous, with herbaceous bracteoles; perianth segments membranous, lanceolate, free nearly from base, the two outer (or rarely 3) producing in fruit winglike outgrowths below the middle; stamens 5; anthers linear; appendages bladdery-saccate, with a long or short stipe; staminodes none; stigmas 2, subulate or linear-subulate; style short; fruit vertical, compressed; seeds with spiral embryo, the radicle pointing upward. Annual plants with alternate semiterete leaves. The genus contains 6 genera.

1. Perianth segments acute; appendages of anthers oblong-oval, sessile. 4. *H. lipskyi* Pauls.
- + Perianth segments 2-toothed at apex; appendages of anthers stipitate 2.
2. Bracts and bracteoles acute or cuspidate; appendages of anthers pure yellow, with stipe ca. 1 mm long; anther locules free at least to the middle; stigmas shorter than to about as long as style. 1. *H. rariflorum* C. Koch.
- + Bracts and bracteoles obtuse; appendages of anthers roseate or creamy-white, with stipe ca. 0.25—0.5 mm long; anther locules free to one-third; stigmas many times longer than style 3.
3. Leaves, especially the upper, and stem in upper part farinose with bladdery hairs. 3. *H. roseum* (Trautv.) Iljin.
- + Leaves not farinose 2. *H. kulpianum* (C. Koch) Bge.

1. *H. rariflorum* C. Koch in Linnaea XVII (1843) 314; Bge. Anabas. rev. (1862) 83; Boiss. Fl. Or. IV, 982; Grossg., Fl. Kavk. II, 81. — *H. aucheri* Moq. in DC. Prodr. XIII, 2 (1849) 204. — *H. robustum* Bge., l. c., 83. —

* From Greek hals, salt, and anthos, flower.

H. lanatum Bge., l. c., 83. — ? *H. lilacium* Bge., l. c., 83. — *H. belangeri* Bge., l. c., 83. — ? *H. spicatum* Bge. in Boiss., l. c., 982. — *Halocharis pycnantha* C. Koch in Linnaea XXIV (1851) 91 (non XXII, 193). — *H. abichii* C. Koch, l. c., 92. — *Halogeton rariflorus* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 834. — *Halimocnemis kowalewskii* Sczegl. in Bull. Soc. Nat. Mosc. XXVI (1853) 328. — Ic.: Sczegl., l. c., t. 5, f. 3. — Exs.: Szovitz, no. 405.

344 Annual, 5—40 cm high, branched from the base, covered with loose tomentum of short implexed hairs, this either persistent (var. *aucherianum* Boiss.) or soon disappearing or plants glabrate (var. *abichii* Boiss.); stems and branches mostly zigzag-bent at nodes; leaves alternate, flattened-semiterete, 10—25 mm long and 1—2 mm broad, obtuse, often terminating in an acute tubercle, spreading; upper leaves and bracts dilated at base, slightly decurrent, abruptly terminating in a very short often curved cusp; bracteoles lanceolate, navicular, equaling or slightly surpassing the perianth, much shorter than bracts except the uppermost about as long as the bracts; perianth segments 5, ca. 6 mm long, lanceolate, membranous, slightly notched at apex, with a mucro in the notch, covered on the back with short scattered appressed hairs; two of the segments winged in fruit below the middle, the wings transversely suboval, membranous, at first yellowish, subsequently mostly purple; a third segment often with a narrow reduced wing; the other segments unchanged in fruit; stamens 5; anthers linear, 3—4 mm long, with locules free to the middle; appendage yellow, rarely whitish (var. *belangeri* Boiss.), fungiform, the cap ca. 2—2.5 mm across and ca. 1—1.5 mm high, abruptly passing into a twisted stipe ca. 1 mm long; stigmas filiform-subulate, slightly shorter than style, together with it 3.5—5.5 mm long, recurved at tips; fruit oval, ca. 2.5 mm long. June. (Plate XVI, Figure 3a—c).

Gypsiferous clays. — Caucasus: Dag. and S. Transc. Gen. distr.: Arm.-Kurd. Described from the Araks River valley. Type in Berlin.

2. *H. kulpianum* (C. Koch) Bge. Anabas. rev. (1862) 80; Boiss. Fl. Or. IV, 981; Grossg., Fl. Kavk. II, 81. — *Halimocnemis kulpiana* C. Koch in Linnaea XVII (1843) 313; Fenzl in Ldb. Fl. Ross. III, 848. — *Halimocnemis pycnantha* C. Koch in Linnaea XXII (1849) 193 (non XXIV, 91). — *Halocharis kulpiana* C. Koch in Linnaea XXIV (1851) 92. — Exs.: Pl. or. exs. no. 61.

Annual, 5—40 cm high, branched from base, covered with slender flexuous hairs, subsequently glabrescent; branches mostly drooping; leaves alternate, semiterete, 10—20 mm long and 1.5—2 mm in diameter, obtuse, spreading; bracts shorter, dilated at base, obtusely keeled, cartilaginous-indurated in fruit, slightly surpassing the bracteoles except the uppermost, these slightly shorter than bracteoles and the exerted perianth; flowers crowded at ends of branches; bracteoles lanceolate, navicular, obtuse, as long as fruiting perianth or more often shorter and then with an indurated basal tubercle; perianth segments lanceolate, 6—7.5 mm long, membranous, 2-toothed at apex, appressed-hairy on the back; two outer segments of fruiting perianth enveloping the others, winged below the middle, the wings membranous or merely membranous-margined, incised-toothed, mostly rosy-purple, spreading;

anthers linear, 3.25—4 mm long, with locules free for one-third the length; appendage inflated, cap-shaped, roseate or whitish, 1.75—2 mm long and 2—2.5 mm broad, rather abruptly narrowing into a stipe 0.25—0.5 mm long; stigmas subulate, 4—6 mm long; style 0.5—1 mm long; fruit oval, ca. 2.5—3 mm long. June—July.

345 Gypsiferous clays. — Caucasus: S. Transc. Gen. distr.: Arm.-Kurd. Described from the vicinity of the village of Kul'p on the Araks River. Cotype in Leningrad.

3. *H. roseum* (Trautv.) Iljin in Acta Inst. Bot. Ac. Sc. URSS, sér. 1, II (1936) 131. — *H. kulpianum* var. *roseum* Trautv. in A. H. P. IV, 1 (1876) 181.

Annual, 3—30 cm high, glaucous, branched from the base, with elongated and ascending lowest branches, covered with soft flexuous fugacious hairs, in upper part with short subappressed hairs; leaves alternate, semiterete, 5—20 mm long and ca. 1.5—2 mm in diameter, thickish, obtuse, spreading, and, especially the young upper ones, densely farinose with sessile bladderly hairs; bracts dilated at base, equaling or slightly surpassing the bracteoles; flowers crowded at ends of stems and branches; bracteoles dilated and convex below; fruiting bracteoles indurated-gibbous at base, as long as or shorter than perianth; perianth segments lanceolate, membranous, 2-toothed at apex, 6—7.5 mm long, covered on the back with short appressed hairs; two other segments more hairy, winged below the middle, enveloping the 3 unchanged segments; anthers linear, 3.5—4 mm long, with anthers free to one-third; appendage saccate, rosy or purple, ca. 2 mm long and 2.5 mm broad, with abrupt broadly cuneate transition to stipe ca. 0.5 mm long; stigmas subulate, 3.5—4 mm long; style 0.5—1 mm long; fruit oblong-oval, ca. 3 mm long. July—August.

Garden solonchaks. — Caucasus: S. Transc. Gen. distr.: Arm.-Kurd. Described from Kagyzman on the Araks River. Type in Leningrad.

4. *H. lipskyi* Pauls. in Lieut. Olufs. sec. Pamir exp. in Vidensk. Meddel. fra den naturh. Foren i Kbhvn. (1903) 203.

346 Annual, glaucous, densely covered with short hairs; stem branched, with arcuately ascending branches; leaves 10—15 mm long, alternate, semiterete, slightly channeled above, obtuse, dilated at base; bracteoles leaflike, shorter than bracts, at the summit of inflorescence scalelike and surpassing the bracts; perianth segments 5, membranous, free nearly to base, acute; two outer segments hairy, 6-nerved, in lower part, winged in fruit; a third segment 3-nerved, with a small wing; the other segments 1-nerved below and wingless; anthers linear, ca. 1.5 mm long, with locules free to one-third their length; appendage oblong-oval, ca. 1 mm long, sessile; stigmas subulate, ca. 4 mm long; style obsolescent.

Loess deserts. — Centr. Asia: Kara K. (Kara-Kalpak ASSR). Endemic. Described from the vicinity of Kunya-Urgench in the N. part of the Kara-Kum Desert. Type in Copenhagen.

Note. I have been unable to see the original specimens of this species but, judging by the description, it may be suspected that we are dealing here with one of the *Salsola* species rather than with the genus *Halanthium*.

Flowers perfect, 5-merous, with herbaceous bracteoles, subtended by bracteoles, these opposite or more rarely subopposite, united at and becoming indurated-cartilaginous in fruit; perianth segments 5, lanceolate, membranous, hairy, unchanged in fruit; stamens 5; anthers linear; appendages yellow, bladdery, with a rather long twisted stipe; stigmas subulate or filiform, much longer than style; fruit oval or oblong-oval, compressed, vertical; seeds with spiral embryo. Annual plants with alternate or opposite leaves. The genus contains about 6 species.

1. Leaves opposite; plant, including perianth segments, covered throughout with crisp, closely appressed hairs 4. *G. ferganicus* Iljin.
- + Leaves alternate except lowermost pairs and bracts; indument different from the above 2.
2. Hairs of two kinds, some short and appressed or subappressed, others long, articulate and spreading; perianth segments 2-toothed at apex 3. *G. pilosus* (Pall.) Bge.
- + Hairs short, of one kind; perianth segments acute 3.
3. Hairs appressed 1. *G. gamocarpus* (Moq.) Bge.
- + Hairs spreading 2. *G. kelifi* Eug. Kor.

1. *G. gamocarpus* (Moq.) Bge. Anabas. rev. (1862) 77; Boiss. Fl. Or. V, 980. — *Halocharis gamocarpa* Moq. in DC. Prod. XIII, 2 (1849) 201 — *Halimocnemis gamocarpa* Chenop. (1840) 155. — *Gamanthus ovinus* Bge. in Boiss., l. c., 980 et in A. H. P. VI, 2 (1880) 447; Korovin, Rast. Sr. Azii 64. — Exs.: H. F. A. M. no. 233.

347 Annual, 3–20 cm high, with a slender flexuous root; stem and leaves covered with appressed upright hairs, rarely almost glabrous (var. *subglabra* Iljin), branched from the base, the lowest branches opposite, mostly much elongated and decumbent or ascending, the others alternate; leaves filiform-linear, semiterete, 15–50 mm long and 1–2 mm in diameter, keeled beneath, very slightly channeled above, spiny-tipped, dilated at base, slightly recurved or straight and spreading; bracts opposite, in fruit united and cartilaginous-stony, enclosing the fruit, with recurved foliaceous tips nearly always straightening out in fruit, 5–50 mm long, greatly surpassing bracteoles and flowers; bracteoles narrowly lanceolate, submembranous, hairy-ciliate, acute, shorter than perianth; perianth 5–6 mm long; segments membranous, lanceolate, acute, appressed-hairy on the back; anthers linear, 2.5–4 mm long, their locules free to between half and two-thirds their length; appendages oval-clavate, yellow, inflated, with a long twisted stipe, 2–3 mm long; stigmas thickish, subulate, 2.5–3 times as long as style, together with it 2.5–4 mm long; fruit fleshy, compressed, oval, at transition to style cartilaginous. May–June.

Clayey solonchak deserts, solonchak sands, takyrs, mottled clays, and in cultivated fields. — Centr. Asia: Balkh. (rare), Kara K., Kyz. K., Syr D., Amu D., Mtn. Turkm. Gen. distr.: Iran. Described from Iran. Type in Paris.

* From Greek gamos, marriage, and anthos, flower.

Economic importance. Considered as fattening forage for sheep. Analysis of field-dry Turkmenian plants gave the following percentage composition: hygroscopic water 9.10, ash 21.23, crude protein 4.39, albumin 3.55, crude fat 2.33, nitrogen-free extract 57.63, crude cellulose 14.42. The above-ground parts in fruiting condition (under the name *G. ovinus* Bge.) gave the following analysis: hygroscopic water 6.89, crude protein 7.20, crude cellulose 9.69, crude fat 1.80, ash 39.88, nitrogen-free extract 44.43 (Agababyan, Granitov, and Kasimenko).

Note. This species is based on Belanger's specimens which we do not have in our herbarium but, judging by Moquin's original description and, more particularly, the detailed description given by Bunge (*Anabas.* rev. 1862) and based on the original specimens which were in his possession as well as his own collections which are preserved in the Herbarium of the Botanical Institute of the Academy of Sciences, the species does not differ from *G. ovinus* Bge. (1880). Later authorities, referring to the statement concerning the bracts of the latter species: "summis confertis saepe geminis suboppositis," have lent added stress to this difference between the two species that does not in fact exist. Thus, in reporting *G. ovinus* Bge. in H. F. A. M., Prof. E. P. Korovin distinguishes between the species concerned in this way: "Folia floralia opposita, basi connata" for *G. gamocarpus* Moq., and "Folia floralia alternata, saepe approximata libera vel basi paulo connata" in the case of *G. ovinus* Bge., and in this differentiation he follows E. Boissier. As a matter of fact, the bracts are never alternate and are always clearly united. Similarly, Boissier's indication as regards white anther appendages in *G. gamocarpus* Moq. and lemon-yellow in *G. ovina* Bge., fails to stand up to critical examination of factual material. Moreover, in his original description of *G. gamocarpus*, Moquin reports yellow anther appendages, and a similar statement occurs in the very precise diagnosis presented in Bunge's monograph. I therefore conclude that the two species are synonymous. It should be noted, by the way, that specimens with reddish-lilac appendages are to be found occasionally.

2. *G. kelifi* Eug. Kor. in Not. syst. ex Herb. Horti Bot. Reip. Ross. V, 11—12 (1924) 2.

Annual, 10—15 cm high, with long branches from the base; stem and branches densely covered with short spreading hairs except at the very base; leaves alternate, glaucous, linear, 10—20 mm long, thickish, convex beneath, slightly channeled above, somewhat decurrent, spreading, terminating in a short yellow spine, densely covered with short spreading hairs; bracts opposite, leaflike, but united at the slightly inflated base, spreading in upper part, markedly surpassing flowers and bracteoles; bracteoles lanceolate, hairy, much shorter than perianth; perianth segments lanceolate, cuspidate, concavo-convex, membranous, appressed-hairy on the back, unchanged in fruit, 5—6 mm long; anthers linear, scarious-margined, with locules free to between one-half and three-fourths; appendage bladdery, yellow, oval-clavate, 2—3 mm long and ca. 1 mm in diameter, gradually passing into a long slightly twisted stipe: stigmas 2, subulate, 2.5—3 times as long as style, together with it 4—4.5 mm long; fruit cartilaginous at the top, ca. 3 mm long. June—July. (Plate XVI, Figure 1).

Red sandstone and gravelly slopes, loess hills, and hollows in residual Tertiary chalk outcrops. — Centr. Asia: Kyz. K. (S.), Syr D., Amu D. Endemic. Most probably will be found in Afghanistan. Described from near the village of Okuz-bulak in the Kelif district. Type in Tashkent; cotype in Leningrad.

Note. This species may be merely a form of *G. gamocarpus* Bge.

3. *G. pilosus* (Pall.) Ege. Anab. rev. (1862) 79; Boiss. Fl. Or. IV, 980. — *Salsola pilosa* Pall. Illustr. (1803) 28 (non It. II, 477). — *Halimocnemis malacophylla* C. A. M. in Ldb. Fl. Alt. I (1829) 387 (non Kar. et Kir.). — *H. malacophylla* α *hirsuta* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 846. — *Polycnemum malacophyllum* M. B. in Mém. Soc. Nat. Mosc. I (1806) 152. — Ic.: Pall. Illustr., t. XX.

349

Annual, 5–30 cm high, clothed with long articulate soft spreading hairs and short subappressed or appressed ones, branched from the base; lowest branches opposite, elongated, the others, like the leaves, alternate; leaves 15–35 mm long, semiterete, thickish, 1.5–2 mm in diameter, terminating in a very short cartilaginous brown conical point, spreading; bracts obliquely opposite or subopposite, enlarged in fruit in lower part and united, becoming rigidly cartilaginous, enclosing the flower and borne on pedicels thickened in upper part; bracteoles equaling or surpassing the flower, lanceolate, navicular; perianth segments lanceolate, membranous, 6–8 mm long, notched-dissected at apex, covered on the back with very short scattered hairs; anthers linear, 3.25–3.5 mm long, with locules free to between one-third and half their length; appendage yellow, bladdery, ovate, tapering to a short tip, with a twisted stipe, together with it 1.25–2 mm long; stigmas 2, filiform, 5–9 mm long; style 0.5–1.25 mm long; fruit oblong-oval, ca. 3 mm long. May–June. (Plate XVI, Figure 2).

Solonchaks. — Caucasus: Dag., E. and S. Transc. Gen. distr.: Arm.-Kurd. Described from the Mugan Steppe and the Araks River in Transcaucasia. Type in London.

4. *G. ferganicus* Iljin in Acta Inst. Bot. Ac. Sc. URSS, sér. 1, II (1936) 131.

Annual, 5–50 cm high; stem erect, with opposite branches from base, covered, like the leaves, with rather closely appressed crisp hairs, hence often grayish, subsequently glabrescent in lower part; leaves all opposite, thickish, semiterete, 15–25 mm long and 2–2.5 mm in diameter, very slightly dilated toward base, terminating in a short brownish obtusish point and subsequently with a caducous terminal tuft of articulate bristles, spreading and mostly somewhat recurved, the lowermost soon wilting; bracts concavo-convex in lower part, enveloping the flower, surpassing flower and bracteoles; perianth 4–6 mm long, longer than bracteoles; segments lanceolate, membranous, obtusish and mostly slightly notched at apex, with crisp hairs on the back; anthers linear, 2.5–3 mm long, with locules free to between three-fourths and four-fifths their length; appendage yellowish, bladdery, oval-clavate or globular-clavate, 1.5–2 mm long, with a long twisted stipe, slightly emarginate at tip; stigmas subulate, 2.5–3 times as long as style, together with it 3–3.5 mm long. June–July.

Gravelly wormwood-saltwart foothill deserts. — Centr. Asia: Syr D. Endemic. Described from the vicinity of Kyzyl-Kiya in the Kirghiz ASSR. Type in Leningrad.

Genus 445. **CORNULACA*** DEL.

C. A. M. in Ldb. Fl. Alt. I (1829) 378.

Flowers perfect, bracteolate, solitary or in few-flowered glomerules, mostly in 3's, in the axils of bracts; stamens 1—5; anthers unappendaged; filaments inserted on an obsolescent disk; stigmas 2, mostly filiform; perianth segments 5, hyaline, free nearly to base, the anterior segment developing in fruit a long indurated prickle. Annuals or small shrubs, with short alternate closely approximate leaves. The genus contains about 6 species.

1. *C. korshinskyi* Litw. in Schedis ad Herb. Fl. Ross. VIII, 3 (1901) 78. — Ic.: Paulsen, The Sec. Pamir. Exped. (1912) f. 68. — Exs.: HFR no. 889.

Annual, 15—50 cm high, densely branched from the base; branches spreading; stem glabrate below, covered in old parts with whitish longitudinally splitting bark, elsewhere densely covered with short papilliform often glandular hairs; ramal leaves tightly closed, 5—8 mm long, dilated and concave at base, gradually tapering to a yellowish mostly somewhat recurved spine 3—6 mm long, roughened with short papillae, with a dense axillary tuft of long hairs concealing the flowers; flowers very small, 1 to 3 together, with perianth 0.5—0.75 mm long; perianth segments linear-filiform, often bifid, united below the middle, mostly unequal, accrescent in fruit; fruiting perianth ampullaceous, surrounding the fruit, the spiniform beak 3—4 mm long, arising from the apex of the anterior segment; stamens 1 or 2; anthers oval-oblong, unappendaged; pistil with style and very long filiform stigmas; fruit vertical, lurid, scarcely compressed laterally, the upward pointing radicle of the embryo very prominent. July—August. (Plate XIV, Figure 5 a—b).

Sands and saline clays. — Centr. Asia: Kara K., Kyz. K., Amu D. Endemic. Described from Turkmenistan (Farab). Type in Leningrad.

Genus 446. **HALOGETON*** C. A. M.

C. A. M. in Ldb. Fl. Alt. I (1829) 378.

51 Flowers perfect and partly pistillate, bracteolate; perianth of 5 segments free nearly to base, embedded in a dense tuft of long white hairs; perianth segments gibbous, winged in fruit; stamens 2—5, unappendaged, united at base into hypogynous disk with glandular lobes; stigmas 2, filiform; seed vertical, compressed laterally, exalbuminous, the radicle of the spiral embryo pointing upward. Annual plants with fleshy alternate leaves. The genus contains 4 species.

1. Leaves, especially the uppermost, mostly terminating in a long or rarely short caducous bristle; stamens nearly always 2; seed vertical 2.
- + Leaves without a bristle, rarely terminating in an obsolescent acute tubercle; stamens mostly 5; seed horizontal; stem whitish, floccose-arachnoid when young 3. *H. arachnoideus* Moq.

* Name already to be found in the writing of Dioscorides and apparently referring to *Salsola*, derived from cornu, horn.

** From Greek hals, salt, and geiton, neighbor.

2. A stoutish, glaucous plant with mostly smooth leaves; perianth segments and lobes of fruiting perianth obtuse or acute, broadly triangular, mostly entire; filaments of stamens with staminodes adhering in lower part 1. *H. glomeratus* (M. B.) C. A. M.
- + A slender plant, resembling in habit *H. arachnoideus*, green and mostly roughened with small papillae; perianth segments and lobes of fruiting perianth acuminate or tapering from a broad base to a point, with toothed-incised margins; filaments of stamens smooth 2. *H. tibeticus* Bge.

Section 1. *EUHALOGETON* Fenzl in Ldb. Fl. Ross. III, 2 (1851) 832; Bge. Anabas. rev. (1862) 94. — Seeds vertical; anthers 2, on filaments united into two clusters (in USSR species).

1. *H. glomeratus* (M. B.) C. A. M. in Ldb. Fl. Alt. I (1829) 378; Fenzl in Ldb. Fl. Ross. III, 2, 832; Kryl., Fl. Zap. Sib. IV, 975; Il'in in Fl. Yugo-Vost. IV, 238. — *Anabasis glomerata* M. B. in Mém. Soc. Nat. Mosc. I ed. 2 (1806) 110. — *Salsola glomerata* Steph. ex Ldb., l. c. — Ic.: Ldb. Ic. pl. Ross. t. 40; Fl. Yugo-Vost. IV, ill. 294. — Exs.: H. F. A. M. no. 119 and 3089.

352 Annual, 3—40 cm high, glaucous, glabrous, densely and profusely branched from the base; leaves thick, 3—12 mm long, terete, firm, dilated at base and half-clasping, obtuse and terminating in a long caducous bristle, with a tuft of long white hairs and reduced branchlets in the axils; glomerules in the axils of nearly all leaves; bracteoles ovate; perianth segments membranous, semipellucid, ovate, becoming more oblong in fruit, 1-nerved, with pellucid membranous wings; stamens united by their filaments into two clusters of 2 or 3, with but one anther to each cluster; fruit round or rounded-oval, 1.25—1.75 mm long, with thin membranous whitish pericarp; seeds olivaceous. July—August. (Plate XIV, Figure 6a—c).

Sandy solonetz steppes, gravelly steppe slopes, and puffy solonchaks. — European part: L. V. (Gur'ev); W. Siberia: Irt., Alt.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kyz. K., Kara K. (N.), Syr D., T. Sh. (foothills), Pam.-Al. Gen. distr.: Dzu.-Kash., Mong. Described from Siberia (apparently from NE Kazakhstan). Type in Leningrad.

Economic importance. The very closely related Spanish species, *H. sativus* C. A. M., is used as a vegetable. It is possible that our species might be put to similar use.

2. *H. tibeticus* Bge. Anabas. rev. (1862) 94.

Annual, 5—25 cm high, resembling in habit the next species, profusely long-branched from the base; stem and branches yellowish-green, nearly always purple-tinged, scabrous; leaves green, semiterete, thickish, very slightly clavately enlarged toward apex, obtuse, terminating in a capillary often caducous mucro, half-clasping scarious-margined and flattened at base, slightly keeled beneath, often slightly concave above, with an axillary tuft of hairs, commonly rough with small papillae; bracts and, more pronouncedly, bracteoles embracing the flowers, broad, navicular; flowers

in glomerules all along the stem; perianth segments acuminate or produced into a point, always subincised-toothed, winged in fruit close to the summit, the membranous wings rather faintly nerved; segments 2 or rarely 3, with simple filaments; fruit vertical, 0.8—1.25 mm long, rotund or rounded-oval, with embryo clearly discernible on one side, the other side very slightly curved. July—August.

Stony slopes. — Centr. Asia: Pam.-Al. (only in the Pamir). Gen. distr.: Tibet. Described from W. Tibet. Type in London.

Section 2. MICROPEPLIS Bge. Anabas. rev. (1862) 97. — *Micropeplis* Bge. Rel. Lehm. (1851) 298 et 303, gen. — Seeds horizontal; each filament bearing an anther, the filaments free.

3. *H. arachnoideus* Moq. in DC. Prodr. XIII, 2 (1849) 205; Ldb. Fl. Ross. III, 2 (1851) 833; Bge. Anabas. rev. (1862) 98; Kryl., Fl. Zap. Sib. IV, 976. — *Micropeplis arachnoidea* Bge. Rel. Lehm. (1851) 303.

353 Annual, 5—40 cm high, densely branched from the base; stem and branches whitish, densely villous-arachnoid when young, later disruptedly floccose-arachnoid or practically glabrescent, often additionally vested with scattered short hairs near the base; leaves closely approximate, fleshy, 2—10 mm long, terete, very slightly dilated at base, half-clasping and broadly scarious-margined at base, obtuse or very rarely terminating in an acutish tubercle, with an axillary tuft of hairs; bracts broader; bracteoles ovate; both bracts and bracteoles carinate, concave on the inside; flowers concealed by the paired bracteoles, borne all over the plant from the very base; perianth segments membranous, oblong, 1-nerved, obtuse or acute but not acuminate, entire or sparingly toothed, winged in fruit very close to the summit; wings membranous, subpellucid, prominently flabellate-nerved; fruit rotund or rounded-oval, 0.75—1.25 (mostly 1) mm long, slightly convex beneath, somewhat concave above, glabrous, the thin membranous pericarp radially rugulose beneath, subreticulately pitted above especially on the periphery; seed the shape of the fruit, olivaceous-brown, glabrous and smooth. July—August.

Gravelly solonchaks, solonchaks, stands of *Lasiagrostis splendens*, and old fields. — Centr. Asia: Balkh., Dzu.-Tarb., T. Sh. (E.). Gen. distr.: Dzu.-Kash., Mong.-Tib. Described from Mongolia. Type in Leningrad.

Note. Prof. Ulbrich (Engl. u. Prantl. Pflanzenf. 2 Aufl. 16 c, 1934, 583) recently raised this species to generic rank again, as Bunge did on one occasion (1851) but then again denied the generic distinctiveness of this plant in his monographic Anabas. rev. (1862).

Genus 447. **SYMPEGMA*** BGE.

Bge. in A. H. P. VI, 2 (1880) 450.

Flowers perfect, in groups of several at the ends of branches, 5-merous, ebracteolate; perianth segments free nearly to the base, two outer and three inner ones, all winged in fruit; stamens 5, the linear filaments united into a ring; anthers oblong-oval, attenuate at tips, terminating in a minute

* From Greek *sympēgō*, to bring together, join.

obsolescent caducous appendage; ovary vertical, with a short style; stigmas 2, somewhat longer than style, villous on the inside; seed exalbuminous, with spiral embryo. A monotypic genus.

1. *S. regelii* Bge. Enum. sals. in Mém. biol. d. Bull. de l'Acad. Pétersb. X (1880) 306; A. H. P. VI, 2 (1880) 450.

354 Undershrub, 10—40 cm high; stem short and rather stout, with blackish-gray bark; branches numerous, divaricate, short, woody; annual shoots mostly covered, like the leaves, with papilliform hairs; leaves fleshy, glaucous, flattish above, semiterete beneath, terminating in a very short prickly, constricted close to base and again dilated below and falling at the constriction, the persistent enlarged leaf bases replacing outer bud scales; flowers compressed laterally, gathered in groups of several at the ends of branches and subsequently forming indurated heads surrounded by an involucre of 2 to many bracts, these united and commonly gibbous at base; perianth segments oblong, narrowly scarious-margined, widely convergent at apex, obtusish; the two outer segments broader, in fruit thicker, often keeled, indurated and often gibbous at base, winged near the summit; all segments of fruiting perianth subnavicular, with oblong or oval darkish subopaque wings, the wings of the two outer segments mostly larger than the rest; seed almost round, 1—1.25 mm in diameter, lurid, glabrous and smooth. July—August. (Plate XIV, Figure 8 a, b).

Pebbles, conglomerates, gravelly slopes, moraines, and gravelly solonchak deserts. — Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. (NE). Gen. distr.: Dzu.-Kash. Described from the vicinity of Lake Issyk-kul'. Type in Leningrad.

Family IV. **AMARANTHACEAE** * JUSS.**

Flowers unisexual or perfect, small, crowded in axillary glomerules or disposed in compact spiciform, paniculate or capitate inflorescences; each flower subtended by a bract and 2 bracteoles (the bract is often referred to together with bracteoles); perianth simple; segments 3—5 (2—4), dry, membranous, whitish-green or yellowish, sometimes purplish-red; stamens usually as many as tepals, sometimes connate at base into a membranous tube surrounding the ovary, alternating with membranous pseudostaminodes; ovary superior, 1-celled, containing 1 to many ovules; fruit capsular, indehiscent or circumscissile (opening by an operculum); seeds rounded, lenticular, shining; embryo peripheral, annular, surrounding the endosperm. Annual or perennial herbs with glabrous or more or less pubescent stems and opposite or alternate leaves.

Economic importance. A family of great importance to man. It includes a number of well known weeds (*Amaranthus retroflexus*, *A. albus*, etc.). Some other members of the family are cultivated as ornamental plants, for food, or for medicinal use.

* *Amaranthus* — from Greek *amarantos*, unfading, or from *a*, not (negative prefix), *mareno*, wilt, and *anthos*, flower, i. e., unfading flower, apparently referring to the persistent dry membranous tepals.

** Treatment by I. T. Vasil'chenko.

1. Leaves alternate 2.
- + Leaves opposite 3.
2. Fruit many-seeded **★***Celosia* L.
- + Fruit 1-seeded 448. *Amaranthus* L.
3. Tepals densely woolly outside 451. *Gomphrena* L.
- + Tepals glabrous 4.
4. Flowers in axillary clusters 450. *Alternanthera* Forsk.
- + Flowers in spiciform inflorescences 449. *Achyranthes* L.

Genus **★** *CELOSIA** L.

L. Sp. pl. (1753) 96.

Flowers perfect, terminal and axillary, disposed in spiciform or paniculate inflorescences; bracts 3; perianth 5-merous; stamens 5, fused at base into a membranous tube; ovary 1-celled, containing numerous ovules; fruit a many-seeded capsule, 3—4 mm in diameter, circumscissile (opening by an operculum); seeds vertical, 1.5—2 mm across, metallic-lustrous, obscurely polygonally reticulate. Annual or perennial herbs with erect branched stems; leaves alternate, linear-lanceolate or ovate-lanceolate to ovate.

Economic importance. Cultivated for ornament, mainly in the southern borderlands of the Soviet Union.

1. Leaves narrow, linear-lanceolate 1. **★***C. argentea* L.
- + Leaves broad, ovate to ovate-lanceolate 2. **★***C. cristata* L.

1. **★***C. argentea* L. Sp. pl. (1753) 297; Moq. in DC. Prodr. XIII, 2, 242. — *C. argentea* α *vera* O. Kuntze, Rev. gen. pl. II (1891) 541.

Annual; stem erect, branched; leaves short-petioled or sessile, linear-lanceolate to sublinear; inflorescences spiciform, pedunculate, tapering to a point; bracts narrowly lanceolate, acuminate, shorter than the perianth; tepals 2—3 times as long as bracts, narrowly lanceolate, silvery, shining, scarious, equal, ca. 5—8 mm long. July—September. (Plate XVIII, Figure 1 e).

Cultivated. — Centr. Asia: Syr D., Amu D. Gen. distr.: Ind.-Him., Jap.-Ch., Med., Am. Described from America. Type in London.

2. **★***C. cristata* L. Sp. pl. (1753) 205; Moq. in DC. Prodr. XIII, 2, 242. — *Amarantus cristatus* Noronha, Fl. Jav. Verh. Batav. Gen. V (1790) ed. I, Art. IV, 7.

Annual; leaves oblong-ovate to ovate, rather long-petioled, the veins impressed above and convex beneath; inflorescences sessile, varying greatly in shape, ranging from pyramidal-ovoid and pointed (var. *castrensis* Thell. in Asch. et Gr. Synops. V, 1 (1914) 223) to more or less united, compact and enlarged, often cockscomb-shaped (var. *eucristata* Thell, l. c.); tepals oblong-lanceolate, greatly surpassing the bracts, 5—8 mm

* Derivation of the name uncertain.



PLATE XVIII. 1. *Celosia cristata* L.: a) general view of flower, b) inflorescence branch with bracts, c) fruit, d) stamens, e) leaf of *C. argentea*, f) leaf of *C. cristata*.— 2. *Amaranthus caudatus* L.: a) perianth with lower part of capsule, b) leaf.— 3. *A. paniculatus* L.: a) general view of flower with 2 bracts, b) fruit with perianth segments.— 4. *A. tricolor* L.: a) perianth segments and fruit, b) leaf.— 5. *A. retroflexus* L.: a) fruit with perianth segments and bracts, b) general view of perianth, c) leaf.— 6. *A. albus* L.: a) branchlet with long bracts, b) leaf, c) fruit with perianth and 2 bracts.— 7. *A. blitoides* S. Wats.: a) fruit with perianth, b) leaf.— 8. *A. blitum* L.: a) fruit with perianth, b) leaf.— 9. *A. graecizans* L.: a) fruit with perianth, b) leaf.— 10. *A. lividus* L.: a) fruit with perianth, b) leaf.— 11. *A. thellungianus* Nevski: a) fruit with perianth, b) leaf.— 12. *A. deflexus* L.: fruit with 2-merous perianth.— 13. *Achyranthes bidentata* Blume: a) general view of flower with bracts, b) stamens and pistil, c) summit of stem with flowers, d) stamens (part), e) bract.— 14. *Alternanthera sessilis* (L.) R. Br.: a) portion of branchlet with inflorescences, b) fruit with perianth, c) part of stamens.— 15. *Gomphrena globosa* L.: a) summit of stem with inflorescence, b) general view of flower with bracts.

long, shining, chaffy, usually suffused with purple or pink (more rarely yellowish). July—September. (Plate XVIII, Figure 1 a, d, f).

Cultivated. — Centr. Asia: Syr D., Amu D. Gen. distr.: Ind.-Him., Jap.-Ch., Med., Am. Described from India. Type in London.

Genus 448. **AMARANTHUS** L.

L. Gen. Pl. ed. 1 (1737) 286.

359

Flowers in axillary glomerules and the upper ones usually congested in rather dense interrupted spiciform or paniculate inflorescences, unisexual or rarely perfect, 3-bracted, small, green or tinged yellowish or purplish-red; perianth simple, scarious, of 3—5 (2—4) segments; stamens 3—5; ovary 1-celled, 1-ovuled, with 2—4 filiform stigmas; capsule 1-seeded, membranous, ovoid, circumscissile and opening by an operculum or irregularly dehiscent when ripe; seed vertical, lenticular, with brittle testa, the annular peripheral embryo surrounding the endosperm. Annuals or perennials, with mostly branched or more rarely simple stems; leaves alternate, entire, petiolate, variable in shape, mostly ovate-rhombic, more rarely lanceolate, oblong, elliptic, or oblong-obovate, often slightly emarginate at apex and mucronate. Monoecious or sometimes dioecious plants, green or tinged with various shades of purplish-red. Russian names: amarant, shchiritsa.

Economic importance. This genus contains well known weeds of wide distribution (*A. retroflexus*, *A. albus*). Certain species are cultivated for ornament (*A. caudatus*, *A. paniculatus*) and for food (*A. leucospermus*).

1. Fruit indehiscent 2.
- + Fruit a circumscissile capsule 3.
2. A glabrous plant; leaves obtuse and emarginate; perianth 3-merous 12. *A. lividus* L.
- + Stem and leaves on the veins beneath crisp-hairy; leaves acute; perianth 2-merous (rarely 3-merous) 11. *A. deflexus* L.
3. Perianth 3-merous 4.
- + Perianth 5-(4)-merous 8.
4. Bract* subulately long-acuminate, 1.5—2 times as long as the fruit 7. *A. albus* L.
- + Bract shorter than the perianth 5.
5. Perianth distinctly longer than fruit 6. *A. tricolor* Thell.
- + Perianth shorter than (rarely equaling) the fruit 6.
6. Leaves broad, ovate; seed ca. 1.2—1.4 mm in diameter, with a distinct rimmed sharp margin 8. *A. blitum* L.
- + Leaves narrow, lanceolate or oblong; seed ca. 1 mm in diameter, with an obtuse margin 7.
7. Segments of fruiting perianth oblong-lanceolate or elliptic, obtuse, with mucro ca. 0.25 mm long 9. *A. graecizans* L.
- + Perianth segments lance-subulate, gradually attenuate to awn 0.3—0.75 mm long often reaching the top of the fruit 10. *A. thellungianus* Nevski.

* Here and subsequently the term bract denotes the longest of the bracts.

8. Stem decumbent, branching from base, ascending; leaves obovate, small; perianth mostly 4-merous 5. *A. blitoides* S. Wats.
- + Stem erect; leaves ovate or broadly lanceolate, rather large; perianth 5-merous 9.
9. Leaves acute; inflorescence spreading, paniculate with spiciform branches 10.
- + Leaves obtuse, emarginate; inflorescence very compact, compressed; segments of fruiting perianth spatulately enlarged toward apex 4. *A. retroflexus* L.
10. Terminal spike erect; inflorescence branches more or less pointed at the ends 3. *A. paniculatus* L.
- + Terminal spike long, pendulous; lateral glomerules rounded in outline, subglobose 11.
11. Inflorescence red; seeds black or dark brown 1. *A. caudatus* L.
- + Inflorescence green; seeds light-colored, roseate or white 2. *A. leucospermus* S. Wats.

1. *A. caudatus* L. Sp. pl. (1753) 990; Moq. in DC. Prodr. XIII, 2, 255; Ldb. Fl. Ross. III, 856; Boiss. Fl. Or., 988; Thell. in Asch. u. Graeb. Synops. V, 1 (1914) 86, 232.

Annual; stem fleshy, commonly reddish, 30—100 cm long, mostly puberulent, simple or slightly branched, sulcate; leaves long-petioled, rhombic-ovate or oval or broadly oblong-lanceolate, cuneate at base, acute; inflorescences spiciform; terminal spike very long, branched in lower part, pendulous; glomerules compact, rounded in outline, subglobose, in lower part of inflorescence distant, in upper part approximate; bracts apiculate, longer than perianth; tepals 5, ovate-lanceolate, shorter than the fruit; capsule broadly ellipsoid, circumscissile; seed ca. 1 mm long, dark brown to black; stamens 5. July—August. (Plate XVIII, Figure 2 a, b).

In cultivation and as a weed. — European part: Bl., Crim., Caucasus: all regions; Centr. Asia: Amu D., Syr D., T. Sh., Pam.-Al. Gen. distr.: Tib., Ind.-Him., Iran., Bal.-As. Min., E. and W. Med., Centr. Eur., Atl. Eur., Afr., N. and S. Am. Described from Peru, Iran, and Ceylon.

Economic importance. Cultivated as ornamental for the showy blood-red color (especially of inflorescence) and in the south often escapes from cultivation.

2. *A. leucospermus* S. Wats. Proc. Am. Acad. XXII (1887) 446; Ib. X (1875) 347 sub *A. leucocarpus* (nom. err.). — *A. caudatus* 2 *leucospermus* Thell. in Asch. u. Graebn. Synops. V, 1. (1914) 234.

A vigorous annual, 100—120 (150) cm high, with a stout branched stem; leaves rounded-oval, acute, cuneate at base, the petiole about as long as the blade; inflorescence, like the whole plant, green, paniculate, the long thickened pendulous spikelike branches branched in turn; glomerules rounded, subglobose, in lower part of inflorescences subremote, in upper part approximate; longest bracts surpassing the flowers; lance-subulate from ovate base, acuminate; segments of fruiting perianth 5, oblong or rhombic-obovate, enlarged at apex and mucronate, overlapping, the thickened greenish midrib reaching the tip; fruit scarcely surpassing or as long as the perianth, broadly ellipsoid, circumscissile; seed obtuse-margined,

ca. 1 mm in diameter, white or roseate, the rosy hue often confined to the margin and the center of lighter color, the central endosperm prominent. July—October.

Cultivated and often growing wild; a dangerous weed.— European part: L. Don; Far East: Uss. Gen. distr.: Tib., N. and S. Am. (Cordilleras), Abyssinia. Described from North America, where it is cultivated in the mountains of Arizona. c. 1.

Note. Thellung (l. c.) maintains that the black-seeded forms of *A. caudatus* s.l. (*A. c. 1. alopecurus*) are more closely related to the original white-seeded forms (*A. c. 2. leucospermus*) which have become bleached as a result of cultivation. The species described was cultivated by Academician Komarov in 1933, in the Leningrad Botanical Garden, from seeds obtained from Manchuria, including both showy and typical forms.

Economic importance. The species belongs to ancient grain crops of mountain areas and may be of considerable importance as a food plant, especially in regions of mountain agriculture. Thellung's reports concerning cultivation of *A. caudatus* in Abyssinia, Tibet, and the Cordilleras of South and North America undoubtedly refer to *A. leucospermus*.

3. *A. paniculatus* L. Sp. pl. ed. 2, II (1763) 1406; Moq. in DC. Prodr. XIII, 2, 257; Boiss. Fl. Or. IV, 989; Ldb. Fl. Ross. III, 856. — *A. cruentus* L. Sp. Pl. ed. 2 (1763) 1406. — *A. hybridus* ssp. *cruentus* var. *paniculatus* Thell. Fl. adv. Montpell., 205 (1912) et Amar. in Asch. u. Graeb. Synops. V (1914) 86, 237. — Ic.: Willd. Hist. (1790) t. II.

Annual; stem 20—100 cm high, mostly puberulent, often reddish throughout, fleshy, erect, sulcate; leaves long-petioled, oblong-elliptic or rhombic-ovate, acute, cuneate at base; inflorescence paniculate, purplish-red, more rarely green, the branches spikelike, pointed; terminal spike longer than the lateral; bracts linear-subulate, surpassing the perianth; tepals 5, lanceolate; capsule longer than perianth, circumscissile; seeds ovoid, commonly dark brownish-red, obtuse-margined, ca. 1.5 mm long; stamens 5. July—August. (Plate XVIII, Figure 3, a, b).

Vegetable and ornamental gardens, and weed-infested places, rarely in fields.— European part: Bl., Crim., L. Don, V.-Don, Transv., V.-Kama, U. V., M. and U. Dnp.; Caucasus: all regions; Far East: Uss.; Centr. Asia: Mtn. Turkm., Syr D., Kara K., T. Sh. Gen. distr.: Ind.-Him., Iran., Bal.-As. Min., Med., Atl. Eur., Centr. Eur., Scand. (S.), Afr., Am., Aust. Described from America. Type in London.

Economic importance. May be cultivated for ornament.

4. *A. retroflexus* L. Sp. pl. (1753) 991; Moq. in DC. Prodr. XIII, 2, 258; Ldb. Fl. Ross. III, 856; Boiss. Fl. Or. IV, 989; Thell. in Asch. u. Gr. Synops. V, I (1914) 254. — Ic.: Willd. Hist. Amar. tab. XI.

Annual, mostly pale green, sometimes reddish-tinged, 20—80 cm high; stem erect, simple or branched, grayish by dense short hairs, slightly angled; leaves rather large, ovate-rhombic, obtuse or slightly notched at apex, terminating in a short mucro, smooth above, shortly hairy beneath, on the margin, and on the petiole, this as long as or somewhat longer than

the blade; flowers in glomerules crowded in a green dense and very compact paniculate inflorescence, disposed mainly at the summit of the stem, branched in lower part, oblong-cylindric or ovoid-pyramidal; bracts lanceolate, slenderly long-pointed, nearly twice as long as the perianth; tepals 5, surpassing the fruit, in staminate flowers lanceolate, in pistillate oblong-linear, spatulately enlarged toward apex, obtuse or retuse, mucronulate, whitish-membranous, the slender pale gray midrib mostly failing to reach the apex; stamens 5; capsule 1-seeded, circumscissile, shorter than perianth; seed 1 mm long, black or blackish-brown, very shining, sharp-margined. June—August. (Plate XVIII, Figure 5, a—c).

Vegetable and ornamental gardens, weed-infested places, and field borders. — European part: M. and U. Dnp., Bl., Crim., V.-Don, L. V., Transv., V.-Kama, U. V., Lad.-Ilm.; Caucasus: all regions; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Yeniss., Dau.; Far East: Ze.-Bu., Uss., Uda; Centr. Asia: Balkh., T. Sh., Dzu.-Tarb., Ar.-Casp., Syr D., Amu D., Kyz. K., Mtn. Turkm., Pam.-Al. Gen. distr.: Jap.-Ch., Mong., Iran., Bal.-As. Min., Centr. Eur., Med., N. and S. Am. Described from Pennsylvania. Type in London.

363 Economic importance. The seeds may be used as bird food (in the form of groats). Young boiled leaves are used for food. Young plants (including roots), in mixture with bran, are greedily eaten by swine. These animals also graze readily on mature plants. Suitable for ensilage.

5. *A. blitoides* S. Wats. Proc. Am. Acad. of Arts and Sc. XII (1877) 273. — *A. aragonensis* Senn. Bol. Soc. Arag. Cienc. Nat. IX (1910) 183.

Annual; stem mostly decumbent, branched from base, whitish, glabrous or short-hairy at summit, rather densely leafy, 15—50 cm high; leaves ovate or spatulate to oblong-lanceolate, terminating in a slender mucro to 1 mm long, at base gradually narrowing to petiole, light-margined; flowers in axillary glomerules; bracts lanceolate, shorter than perianth; tepals 4 (sometimes flowers with 5-merous perianth occur on the same plant), in staminate flowers ovate-lanceolate, short-acuminate, in pistillate ones oblong-lanceolate, unequal, crustaceously thickened at base; capsule rounded-ellipsoid, shorter than the longest tepal (this 2—2.5 mm long), circumscissile, with mostly reddish operculum; seed 1.3—1.5 mm long, rounded-ovoid, black, not very shining. August—September. (Plate XVIII, Figure 7, a, b).

Weed-infested places and fields. — European part: Bl., L. Don; Centr. Asia: Ar.-Casp., Kyz. K., Syr D. Gen. distr.: N. and Centr. America, introduced in Europe—W. Med. Described from the western part of N. America.

Note. *A. blitoides*, a North American plant, was first collected in this country by Androsov, on September 13, 1908, on sandy solonchak irrigated fields near Chelkar station on the Central Asian Railroad.

6. *A. tricolor* L. Sp. pl. (1753) 989; Fiori et Paöletti Fl. anal. Ital. I (1898) 321; Baker u. Clarke in Thiselton-Dyer, Fl. Trop. Afr. VI, 1, 32 (1909); Thell. in Asch. u. Graebn. Synops V, 86 (1914) 272, p. p.

Annual, mostly glabrous, with branched or /?/ ascending stems; leaves ovate-rhombic (sometimes narrower), broadest at or below the middle, acute, terminating in a small mucro, long-petioled; flowers

3-merous, in axillary glomerules, gathered at the top into a spiciform inflorescence; bracts somewhat shorter than flowers; tepals 3, membranous, with a greenish midnerve, linear-oblong, gradually tapering to a short awn, 3—4 (5) mm long; capsule shorter than perianth, circumscissile; seed short-ovoid, reddish-brown, shining, without a distinct rim on the rounded margin, compressed toward the hilum, 1—2 mm long. (Plate XVIII, Figure 4 a, b).

Central Asia: Syr D. Gen. distr.: S. Asia. Described from China. Type in London.

Note. A single specimen, referred by us to the *A. tricolor* cycle, was collected in Fergana by O. A. Fedchenko on August 19, 1871, and was identified as *A. melancholicus* L. β *tricolor* Moq. It can be placed, with more justification, among the broad-leaved races of *A. tricolor* even though it displays certain features that distinguish it from this species. It is very desirable to secure more ample material relating to this species which is apparently of South Asian origin.

7. *A. albus* L. Sp. pl. ed. 2 (1763) 1404; Moq. in DC. Prodr. XIII, 2, 264; Boiss. Fl. Or. IV, 909; Thell. in Asch. u. Graeb. Synops. V, 1 (1914) 86, 283. — *A. graecizans* L. Sp. pl. (1753) p.p.

Annual; stem divaricately branched from base; branches whitish, glabrous or more rarely with scattered short scalelike hairs, 20—30 (70) cm high; leaves oblong-obovate or spatulate, round-tipped or retuse, with mucro 0.5—1 mm long, somewhat wavy-margined, narrowing at base to a short petiole; flowers 3-merous, axillary, in glomerules or small spiciform inflorescences; bracts linear-lanceolate, subulate-tipped, conduplicate and hence apparently subulate, rather rigid, scarious-margined toward base, 1.5—2 times as long as the flowers; tepals 3, membranous, in staminate flowers lanceolate, long-acuminate, in pistillate ones linear-elliptic, short-acuminate, about equaling the capsule; capsule obovoid, circumscissile; seeds black, glossy, sharp-margined, ca. 0.8 mm long; stamens 3. July—October. (Plate XVIII, Figure 6 a—c).

Fields, weed-infested places, and roadsides (introduced from N. Am.). — European part: Bl., Crim., L. Don, L. V., Transv.; Caucasus: Cisc., Dag., W. and E. Transc.; W. Siberia: U. Tob., Irt.; Far East: Uss.; Centr. Asia: Ar.-Casp., Syr D., Kara K., Balkh. Gen. distr.: Med., Bal.-As. Min., N. Afr. Described from North America (Philadelphia).

Economic importance. Suitable for silage.

8. *A. blitum* L. Sp. pl. (1753) 990. — *A. blitum* α *sylvestris* Moq. in DC. Prodr. XIII, 2 (1849) 263. — *A. angustifolius* var. *silvester* Thell. in Asch. u. Graeb. Synops. V (1914) 300. — *A. sylvestris* Desf. Cat. Hort. Paris, ex Lois. Not. (1810) 140. — *A. pallidus* M. B. Fl. taur-cauc. II (1808) 309.

Annual; stem erect, sulcate, rather sparsely leafy, 20—70 cm high; leaves long-petioled, broad, ovate to ovate-rhombic, cuneate at base, obtusish, short-mucronate, the margin obscurely sinuate-toothed; glomerules axillary, remote; bracts ovate-lanceolate, shorter than perianth; segments of fruiting perianth 3, elliptic to lanceolate, obtuse, with mucro barely 0.25 mm long, shorter than the fruit; perianth of

staminate flowers 3-parted, the segments ovate-lanceolate, acuminate; stamens 3; fruit rounded-ellipsoid, 1.5—2 mm long, circumscissile, 1-seeded, 1.5—2 times as long as the perianth; seed 1.2 (1.4) mm long, shining, round, the margin distinctly sharp-rimmed, blackish-brown or black. July—August. (Plate XVIII, Figure 8, a, b).

Weed-infested places, vegetable gardens, more rarely fields. — European part: Crim., Bl.; Caucasus: Dag., E. Transc.; Centr. Asia: Mtn. Turkm., Syr D., Kara K., Amu D., T. Sh. Gen. distr.: Iran., Bal.-As. Min., Med., N. Afr., Aust. (adventive). Described from W. Europe. Type in London.

9. *A. graecizans* L. Sp. pl. (1753) 990, p. p. — *A. blitum* δ *graecizans* Moq. in DC. Prodr. XIII, 2 (1849) 263. — *A. silvestris* β *graecizans* Boiss. Fl. Or. IV (1879) 990. — *A. graecizans* α *normalis* O. Ktze. Rev. gen. pl. I (1891) 540. — *A. angustifolius* Lam. Encycl. 1 (1783) 115, sensu stricto. — *A. blitum* γ *angustifolius* Ldb. Fl. Ross. III (1849—1851) 859.

Annual; stems ascending, densely leafy, 10—40 cm high; leaves 1.5—3 cm long and 0.5—1 cm broad, oblong or narrowly lanceolate, short-petioled, obtuse or round-tipped, short-mucronate; flowers 3-merous, in compact glomerules closely disposed on numerous branchlets and forming a densely paniculate leafy inflorescence; bracts lanceolate, shorter than perianth; tepals 3, lanceolate, in pistillate flower obtusish, with mucro barely 0.25 mm long, with midrib thickened at base, shorter than fruit; capsule circumscissile, markedly longer than perianth, 1.5—2 mm long; seed rounded, lenticular, ca. 1 mm broad, shining, black, the margin obscurely blunt-edged; stamens 3; June—August. (Plate XVIII, Figure 9 a, b).

Weed-infested places and cultivated fields. — Caucasus: Dag., E. Transc. Centr. Asia: Kara K. Gen. distr.: Iran., E. Med., NE Afr. Described from Virginia. Type in London.

10. *A. thellungianus* Nevski in Acta Inst. Bot. Ac. Sc. URSS ser. 1, IV (1937). — *A. angustifolius* ssp. *polygonoides* Thell. in Aschers. u. Graebn. Synops. V, 1 (1914) 308, pro min. parte (excl. synon).

366 Annual; stem divaricately branched from base, 20—40 cm high, or simple, erect and higher, deeply sulcate, reddish; leaves oblong to oblong-lanceolate, gradually narrowing down to a short narrow-winged petiole, with prominent whitish-roseate veins beneath, obtuse, short-mucronate; glomerules axillary, the lower remote, the upper approximate and forming an interrupted spiciform leafy inflorescence; bracts narrowly lanceolate, long-acuminate; flowers 3-merous; segments of fruiting perianth lance-subulate, gradually tapering to an awn 0.3—0.75 mm long often reaching the top of the fruit, the midrib inflated at base; capsule circumscissile with mostly reddish operculum, equaling or surpassing the perianth; seed rounded, lenticular, ca. 1 mm broad, shining, black, the margin with an obscure blunt edge; stamens 3. June—August. (Plate XVIII, Figure 11 a, b).

Weed-infested places and cultivated fields. — Centr. Asia: Kara K., Syr D., Pam. Al. Endemic. Described from Turkmenia (Kugitang). Type in Leningrad.

11. *A. deflexus* L. Mant. II (1771) 295. — *A. viridis* Vill. in Gay Fl. chil. V, 220. — *A. prostratus* Balb. Misc. bot. (1806) 44. — *Albersia deflexa* Woron. in Oprel. rast. Kavkaza i Kryma II (1914) 2. — *Euxolus deflexus* Rafin. Fl. Tellur. III (1836) 42.

Annual or perennial (?); stem decumbent or ascending, prostrately branched, pubescent (more densely so in upper part), to 80 cm high; leaves long-petioled, oblong-ovate, acuminate, with a short mucro, cuneate at base, pubescent on the veins beneath; flowers in axillary glomerules and in small terminal spikes often branched at base; bracts triangular-ovate, acute, about half as long as the perianth; tepals membranous, with a green midrib, short-acuminate, in staminate flowers 2 (rarely 3); stamens 3; segments of pistillate flowers 2 (rarely 3), opposite, linear, sometimes subspatulate, about half as long as the fruit; fruit ellipsoid, 1-seeded, coriaceous, indehiscent, 2–3 mm long and ca. 1.5 mm broad, sparsely nerved, the nerves oblong, greenish; seed elongate-ovate, shining, black, 1–1.2 mm long, obtuse-margined, incompletely filling the fruit cavity. June–September. (Plate XVIII, Figure 12 a).

Weed-infested places, gardens, and vineyards. — European part: Bl., Crim.; Caucasus: W. Transc.; Centr. Asia: Pam.-Al. Gen. distr.: Med., Bal.-As. Min., N. and S. Am., Afr. Classical location not reported.

12. *A. lividus* L. Sp. pl. (1753) 990. — *A. oleraceus* L. Sp. pl. ed. 2 (1763) 1453. — *A. viridis* L. Sp. pl. ed. 2 (1763) 1405, p. p. — *A. blitum* auct. pl., non L. — *Albersia blitum* Kunth, Fl. Berol., 2 (1839) 144; Boiss. Fl. Or. IV, 921; Ldb. Fl. Ross. III, 859. — *Euxolus viridis* Moq. in DC. Prodr. XIII, 2 (1849) 273. — Ic.: Willd. Hist. Amar. (1790) tab. 1.

367

Annual; stems branched, glabrous, 25–80 cm high, green, often glaucescent; leaves long-petioled, elliptic or ovate-rhombic, abruptly cuneate at base, commonly broadly emarginate, mucronate, the obscurely toothed margin somewhat hairy; flowers in glomerules disposed in green spiciform inflorescences, of these the terminal elongated, the lateral ones axillary and much shorter than the leaf petioles; bracts triangular-lanceolate, half as long as perianth; tepals 3, narrowly lanceolate, about half as long as the fruit; fruit 1.5–2 times as long as the perianth, elliptic, compressed, indehiscent, 1-seeded; seed partially filling the fruit cavity, lenticular, obtuse-margined, shining, black, 1–1.2 mm long; stamens 3. June–September. (Plate XVIII, Figure 10 a, b).

Fields, weed-infested places, and roadsides. — European part: Bl., Crim., M. and U. Dnp., L. Don, L. V., V.-Don, U. V., Transv.; Caucasus: all regions; W. Siberia: U. Tob., Irt., Alt.,; Far East: Uss.; Centr. Asia: Syr D., Balkh., Amu D., Pam.-Al. Gen. distr.: Jap.-Ch., Mong., Ind.-Him., Iran., Med., Centr. Eur., Bal.-As. Min., Afr., N. Am., Aust. Described from Virginia. Type in London.

Economic importance. The leaves are used for food as green vegetable.

Genus 449. **ACHYRANTHES*** L.

L. Gen. pl. ed. 1 (1737) 34.

Flowers perfect, 3-bracted, disposed in more or less elongated spikes; perianth 4- or 5-merous, with narrowly lanceolate segments; stamens (3)

* From Greek achyron, chaff, and anthos, flower.

4 or 5, fused at base into a column and alternating with membranous pseudostaminodes; fruit a capsule, with 1 vertical seed. Russian-solometsvet.

1. *A. bidentata* Blume Bijdr. (1825—1826) 545; Moq. in DC. Prodr. XIII, 2 (1849) 312; Kom. and Alis., Opred. Rast. Dal'nevost. kr. (1925) 196.

368 Annual; stems branched, clothed with stiff appressed hairs, 4-angled; leaves opposite, oval, mucronate, short-petioled, pale green; flowers in oblong or cylindric spikelike inflorescences, the uppermost terminating the stem, the lateral ones axillary and borne on short peduncles; bracts shorter than perianth, one of them broad-ovate, membranous, with a thickened midnerve produced into a mucro, ciliolate, lacerate-toothed in upper part, persistent on the rachis, this covered with whitish implexed hairs; the other two subulate, 3—4 mm long, slightly curved, stramineous, rather rigid, falling together with perianth and ovary; two scarious toothlike appendages present at the base of these bracts; perianth segments 4 or 5, narrowly lanceolate, greenish, becoming stramineous, ca. 5 mm long, lustrous; stamens 4 or 5, connate at base and alternating with small scarious subtruncate pseudostaminodes; style slightly longer than the filaments; stigma capitate; fruit oval, 1-seeded; seed oblong-cylindric, brownish-black, shining, ca. 1.5 mm long. (Plate XVIII, Figure 13 a—e).

Introduced from Japan. — Far East: Uss. Gen. distr.: Jap.-Ch. Malay Archipelago. Described from Java.

Genus 450. **ALTERNANTHERA** FORSK.

Forsk. Fl. Aeg. Arab. (1775) 28.

Flowers perfect, in axillary glomerules; perianth 5-merous; stamens 5, fused at base into a tube and alternating with subulate (or lanceolate) scarious pseudostaminodes; ovary 1-celled, 1-ovuled; fruit a 1-seeded utricle, laterally compressed, narrowly winged on the margin; seed vertical, round, with semipellucid testa. Annual or perennial herbs; stems prostrate, ascending; leaves opposite.

1. *A. sessilis* (L.) R. Br. Prodr. Fl. Nov. Holl. 1 (1810) 417; Moq. in DC. Prodr. XIII, 2 (1849) 357; Ldb. Fl. Ross. III, 861; Boiss. Fl. Or. IV, 998. — *Gomphrena sessilis* L. Sp. pl. (1753) 225.

Annual, 15—35 (50) cm high, prostrate-branched, decumbent or ascending, angled, rooting in lower part, jointed, with 2 rows of fluffy hairs; leaves oblong-ovate, obtuse, with a short mucro, narrowed toward base and almost sessile, pale green, 2—4 mm long and 0.5—1.5 mm broad; flowers in rounded sessile glomerules, these crowded in the leaf axils in groups of 3 or 4; bracts 3, oblong-ovate, whitish, shining, membranous; perianth segments 5, lanceolate, whitish-scarious, shining, firmly united at the thickened base and furnished there with a pair of prominent tubercles, falling away in one piece; stamens 5, united at base into a column surrounding the ovary and alternating with the pseudostaminodes; ovary with a short style and capitate stigma; fruit a round flat indehiscent light brown 1-seeded utricle, emarginate at summit, surpassing the perianth; seed ca. 1.5 mm long, light tawny, shining, obtuse-margined, the embryo showing through at the margin,

the endosperm glossy. July—August. (Plate XVIII, 14 a—c).

Wet places; a weed of ricefields. — Caucasus: E. and W. Transc., Tal. Gen. distr.: Jap.-Ch., Ind.-Him., Med., Afr., S. Am. Described from New Holland.

Genus 451. **GOMPHRENA** L.

L. Gen. Pl. ed. 5 (1754) 105.

Flowers perfect, 3-bracteate, crowded in spiciform or capitate inflorescences; perianth segments 5, commonly densely fleecy; stamens 5, fused into a tube, surrounding the 1-celled 1-ovuled ovary; fruit a 1-seeded utricle, included in the perianth; seed vertical, round, with semipellucid testa. Annual or perennial herbs, mostly heavily hairy, more rarely glabrous, with opposite leaves.

1. *G. globosa* L. Sp. pl. (1753) 326; Moq. in DC. Prodr. XIII, 2, 409. — *Xeraea globosa* O. Ktze. Rev. Gen. pl. II (1891) 545.

Annual; stems to 30—50 cm long, erect or ascending, commonly trichotomously branched, jointed, clothed with appressed hairs; leaves opposite, oblong-elliptic to lanceolate, mucronulate, entire, subsessile, half-clasping, pubescent, 6—8 cm long, to 2—5 cm broad, pale green; flowers crowded in compact elongate-ovaloid capitate inflorescences, 2—4 cm long and 1.5—2 cm broad, subtended by a pair of small ovate-lanceolate leaves; inflorescences borne at the ends of stem and branches, sometimes also axillary; bracts scarious, one smaller, at the flower base, broad-ovate, terminating in a long cusp, the other two longer, broadly lanceolate, subnavicular, pectinately denticulate on the back, purple-tinged, to 10 mm long, enveloping the flower; perianth segments 5, narrowly lanceolate, densely covered on the outside with implexed rufescent hairs, tightly enveloping the ovary; style long; stigmas 2, filiform; fruit a white-membranous semitransparent ovoid utricle; seed reddish-brown, shining, compressed toward the hilum, round, ca. 1.5 mm long, with embryo showing through. July—August. (Plate XVIII, 15, a, b).

Cultivated: — Centr. Asia: Syr D., Pam.-Al., T. Sh., Dzu.-Tarb., Amu D., Kyz. K., Kara K. Gen. distr.: Jap.-Ch., Ind.-Him., S. Am. Cultivated throughout W. Europe. Described from India.

Note. Schmalhausen (Fl. II, 358) makes a vague reference to cultivation of this species in the southern regions of the European part of the USSR. The plant tends to escape from cultivation.

Economic importance. Cultivated for ornament.

370

Family LV. **NYCTAGINACEAE** LINDL.*

Flowers actinomorphic, perfect or by abortion unisexual; bracts free or united, often cup-shaped, colored; perianth uniseriate, corolloid, of 5 (rarely 3—7) lobes united for much of their length, commonly strongly

* Treatment by B. K. Shishkin.

accrescent and transforming into an involucre enclosing the fruit (anthocarp); stamens 3—6; ovary superior, 1-celled, 1-ovuled; ovule anatropous or campylotropous; fruit a thin-walled achene.

Genus 452. **MIRABILIS*** L.

L. Sp. pl. (1753) 252. — *Allionia* Loefl. It. Hisp. (1758) 181. — *Jalapa* Adans. Fam. II (1763) 265. — *Vitmannia* Turra, apud Cavan. Ic. III (1794) 51, tab. 60; *Vitmannia* Endl. Gen. (1837) 311.

Flowers in a dense pseudo-umbellate many-flowered inflorescence, purple, white or yellow; one or several flowers in a campanulate or cup-shaped involucre,** this commonly 5-parted, rarely 4-parted; stamens 3—5 (6), exserted; fruiting perianth ellipsoid or obpyramidal, glabrous or hairy, 5- or 10-nerved, often tuberculate or rugose. Herbaceous, mostly perennial plants, with tuberlike or napiform roots; leaves simple, opposite, entire, petiolate, exstipulate.

Key to most commonly cultivated and partly naturalized species

1. Perianth tubular or funnel-shaped 2.
- + Perianth campanulate 5.
2. Involucre 3—10-flowered; perianth tube broad; fruiting perianth more or less mucilaginous *M. multiflora* Torr.
- + Involucre 1-flowered; perianth funnel-shaped, its tube often very long and narrow; fruiting perianth ellipsoid, not mucilaginous 3.
3. Perianth tube very long and narrow, often glandular-pubescent *M. longiflora* L.
- + Perianth tube shorter, glabrous or scarcely pubescent 4.
- 371 4. Flowers short-pedicel, inodorous; perianth 2.5 cm long; involucre lobes triangular-lanceolate *M. jalapa* L.
- + Flowers sessile or subsessile, fragrant at night; involucre lobes ovate *M. dichotoma* L.
5. Leaves linear *M. coccinea* (Torr.) Benth. et Hook.
- + Leaves broadly ovate-cordate 6.
6. Stem softly glandular-pubescent; leaves hairy; flowering involucre ca. 3 mm long, subsequently enlarging; perianth roseate, 8 mm long *M. viscosa* Cav.
- + Stem glabrate, with scattered hairs confined to upper part; leaves glabrous, scabrous-margined; involucre ca. 20 mm long; perianth persicolor-sanguine 1. *M. nyctaginea* (Mich.) MacMillan.

From among the plants included in the key and often occurring in cultivation in the USSR, only one species, found as adventive in parks of W. Belorussia, is described.

1. *M. nyctaginea* (Mich.) MacMillan, Metasp. Minnes (1892) 217. — *Allionia nyctaginea* Mich. Fl. bor.-Am. I (1803) 100. — *Oxybaphus*

* From Latin *mirabilis*, wonderful, uncommon.

** The involucre is liable to be mistaken by beginners for the true calyx and thus the flower regarded as sympetalous.

nictagineus Sweet, Hort. Brit. ed. I (1830) 429. — Ic.: A. Georgia, Man. Weeds (1914) tab. 82.

Perennial; stem erect, 40—60 cm high, glabrate, with scattered hairs confined to upper part; leaves broad-ovate, 6—8.5 cm long and 4.5—6.5 cm broad, obscurely cordate or subtruncate at base, obsoletely and unequally toothed, short-acuminate, glabrous, the petiole 1—1.5 cm long; involucre ca. 2 cm long, enlarging, 5-lobed, 3—5-flowered; flowers persicolor-sanguine; fruiting perianth scabrous-pubescent. July.

Parks, gardens, and banks of rivulets; also a weed. — European part: U. Dnp. (Narovl', Mozyr District). Gen. distr.: N. Am., naturalized in gardens of W. Europe and introduced (Montpellier). Described from North America, from the banks of the Tennessee River.

Family LVI. **THELYGONACEAE** EICHL.*

(Cynocrambaceae)

372

Flowers actinomorphic, unisexual, the plants monoecious or dioecious; staminate flowers on upper part of the stem, opposite the leaves; perianth simple, 2- or 3-parted or else 4- or 5-lobed; stamens 10—30, with slender filaments; pistillate flowers in abbreviated 3-flowered dichasia, borne in the leaf axils and subtended by minute bracteoles; perianth small, united, tubular-clavate, mostly with 2 median lobes, more rarely 4-toothed; ovary inferior, 1-carpellate, containing 1 campylotropus ovule; fruit a drupe with thin fleshy pericarp. Annual plants; leaves opposite, on the lower part of the stem fleshy, ovate, with scarious lacerate stipules.

Genus 453. **THELYGONUM** ** L.

L. Sp. pl. (1753) 993. — Cynocrambe Gaertn. Fruct. I (1788) 362, tab. 75.

1. **T. cynocrambe** L. Sp. pl. (1753) 993. — *T. alsinoideum* Lam. Fl. Franc. II (1778) 198. — *Cynocrambe prostrata* Gaertn. Fruct. I (1788) 362. — *C. dioscoridis* Bubani, Fl. Pyren. I (1897) 75. — *C. cynocrambe* Huth in Helios XI (1893) 134. — Ic.: Notizbl. Bot. Gart. u. Mus. no. 109 (1933) 897.

Annual; with slender root; stem 5—35 cm long, branched at base, puberulous on one side, with short upper internodes; leaves ovate, acute, 2—5 cm long, 0.5—1.5 cm broad, sparingly ciliate, with petiole as long as the blade, the lower opposite, the upper alternate, with scarious dissected stipules and often with reduced leafy shoots in the axils; staminate flowers few, soon falling, borne on the upper part of the stem opposite the leaves, 2- or 3-lobed; stamens 6—28, with connate filaments; pistillate flowers mostly on the lower part of the stem, in 3-flowered axillary dichasia. April—May.

In rock crevices. — European part: Crim. (S. slopes of Mt. Ayu-dag) (adventive?). Gen. distr.: W. and E. Med., Bal., Canary Islands, N. Afr. Described from Italy and Montpellier. Type in London.

* Treatment by B. K. Shishkin.

** From Greek *thelis*, female, and *gonu*, knee, referring to the sessile axillary female flowers which remain alone on the stem after the early disappearance of the few staminate flowers, and surmount each joint.

Flowers perfect; perianth simple, mostly persistent in fruit, with 4 or 5 lobes, these free or united at base; stamens 4—10 or indefinite, mostly connate at base; ovary superior, 1- to many-carpellate; fruit fleshy, berrylike. Robust herbs, with entire leaves, racemiform inflorescence, and furcately branched stem.

373 Genus 454. **PHYTOLACCA**** L.

L. Gen. (1737) 136; Sp. pl. (1753) 441.

Perianth actinomorphic, 5-lobed, herbaceous or membranous, sometimes faintly colored; stamens 10—20, rarely fewer; carpels 5—16, mostly 7—10, free or connate; fruit dark red to blackish-red, succulent, berrylike, subsequently drying up; seeds shining, black.

1. *P. americana* L. Sp. pl. (1753) 441, excl. var.; Walter in Engl. Pflanzr. IV, 83 (1909) 52; Grossg., Fl. Kavk. II, 84. — *P. decandra* L. Sp. pl. ed. II (1762) 631; Ldb. Fl. Ross. III, 688. — Ic.: Engl., l. c., f. 17; Hegi, Fl. Mitt. Eur. III (1909) 266; Farmatsevt. zhurnal, no. 7 (1928) 3.

Perennial; root stout, fusiform; stem erect, 1—3 m long, glabrous, green or sometimes reddish; branches furcately branched at ends; leaves alternate, the upper often approximate, ovate to ovate-lanceolate, (10) 15—20 (40) cm long, (2) 3—6 (10) cm broad, the upper smaller than the lower, with a prominent midvein, green, finally often reddening; petiole angled, glabrous, 1—2—3 cm long; inflorescences elongated, racemed, opposite and surpassing the leaves, 10—15 cm and ca. 2 cm broad, peduncled; peduncle straight or somewhat curved, 3—10 cm long; pedicels persistent, 4—6 (10) mm long, 3-bracteolate, the basal bracteole lanceolate, 3—4 (16) mm long and 0.5—1 mm broad, the two upper ones 1—2 (3) mm long; flowers small, ca. 0.5 mm in diameter; perianth lobes rounded-ovate, obtuse, concave above, 2—3 mm long and ca. 2 mm broad, at first whitish, then turning red; stamens 10, half as long as perianth lobes; carpels 10 (12); fruit 10 (12)-ribbed when unripe, surmounted by erect persistent styles, ca. 7—8 mm in diameter, globular and ribless in maturity; seeds reniform-lenticular, ca. 3 mm long, compressed, black, shining. June—September. (Plate XIX, Figure 2a).

A weed of roadsides and habitations; introduced from North America. — Caucasus: Cisc., W. Transc., Tal. Gen. distr.: Centr. Eur., Atl. Eur. (S.), Med., Bal.-As. Min., Arm.-Kurd., Iran., N. Am. Described from Virginia. Type in London.

Economic importance. The juice of berries is used in the Caucasus for dyeing silk fabrics. The plant is cultivated in the vinicultural regions of W. Europe and Asia and the dark juice extracted from the berries is used to color wines. This adulterant is nowadays considered as harmful.

* Treatment by O. I. Kuzeneva.

** From Greek phytón, a plant, and lacca, varnish.

Flowers perfect, actinomorphic; calyx 5-parted; ovary none; stamens 3—20, mostly united at base in clusters or all together, the outer often transformed into narrowly linear petaloid staminodes; ovary superior, 3—5-celled; fruit a 3—5-valvular, usually hard-walled capsule. Annuals with opposite or alternate mostly spuriously verticillate leaves.

Note. Beside the species listed below, the Herbarium of the Botanical Institute of the Academy of Sciences contains a specimen of *Sesuvium portulacastrum* L. (Sp. pl. ed. II, 684) collected in the 1940s by Voznesenskii in Kamchatka, on cliffs in the vicinity of Petropavlovsk. The plant has not since been encountered by anyone. V. L. Komarov (Fl. Kamch. II (1929) 78) suggested that it may have been brought in by boats which used to arrive in those days in Petropavlovsk on their way from the Sandwich Islands, considering that *Sesuvium* grows in coastal sands of the tropics.

1. Calyx campanulate, with a 5-cleft limb; staminodes none 457. *Aizoon* L.
- + Calyx 5-parted nearly to the base; staminodes present or absent . . . 2.
2. Stamens 5; staminodes none; seeds without strophiole 455. *Mollugo* L.
- + Stamens 12; staminodes present; seeds strophiolate 456. *Glinus* Loefl.

Genus 455. **MOLLUGO** ** L.

L. Gen. pl. ed. 1 (1737) 335; Sp. pl. (1753) 89.

Calyx 5-parted, persistent in fruit; corolla none; stamens 5, alternating with sepals; ovary 3-celled, with 3 stigmas, central placentation and several ovules in each cell; fruit a 3-celled 3-valved loculicidal capsule. Small glabrous annuals with linear leaves.

1. *M. cerviana* (L.) Ser. in DC. Prodr. I (1824) 392; Fenzl in Ldb. Fl. Ross. II, 153; Boiss. Fl. Or. I, 756; Fl. I, 165; Shishk. in Fl. Yugo-Vost. IV, 243; Kryl., Fl. Zap. Sib. V, 981. — *Pharnaceum cerviana* L. Sp. pl. (1753) 272. — Ic.: Fiori e Paolettii Ic. Fl. Ital. (1895—1904) tab. 10; Fl. Yugo-Vost. IV, pl. 296. — Exs.: Fl. italica exs. no. 251; Dörfler Herb. norm. no. 4526; HFR no. 1574.

375

Annual, with a straight, slender root; plant glabrous throughout, grayish-green; stems divaricately branched from base, erect or divergent, slender, 3—12 (15) cm long; leaves sessile, linear, gradually narrowing toward base, obtuse or obtuse-pointed, 3—12 (20) mm long and 0.2—0.5 mm broad, the basal rosulately approximate, the cauline spuriously verticillate; inflorescences umbellike, at the ends of branches arising from leaf axils, (2)—3—5-flowered; pedicels several times the length of the flower,

* Treatment by O. I. Kuzeneva.

** Name transferred from *Galium mollugo*, owing to the resemblance of the apparently whorled leaves.

4—10 mm long, slender, erect, spreading in fruit, bracteolate at base with linear-oblong whitish-scarious bracteoles ca. 0.5 mm long; sepals elongate, 2—2.5 mm long, obtuse, white, scarious-margined, with a broad oblong pinnately branched green median band; stamens half to two-thirds as long as perianth; capsule rounded-ovoid, enclosed in and somewhat shorter than the perianth; seeds dark brown, somewhat shining, slightly reticulate. .
June—July. (Plate XIX, Figure 3 a, b).

Sandy and sandy-pebbly soil. — European part: M. Dnp., V.-Don, Bl., Crim. (rare), L. Don, L. V.; W. Siberia: U. Tob. ([former] Ural'sk District, Karan-tyube); Centr. Asia: Balkh. (Lake Zaisan area, Black Irtysh River valley). **Gen. distr.:** Centr. Eur., Med., Bal.-As. Min. Described from specimens collected at Rostok, in Russia, and in Spain. Type in London.

Genus 456. **GLINUS*** LOEFL.

Loefl. ex L. Sp. pl. (1753) 403.

Calyx deeply 5-cleft, persistent in fruit; corolla none; stamens 3—20; narrow staminodes present; ovary 3—5-celled, ovoid; styles 3—5; fruit a loculicidal capsule, containing numerous seeds. Heavily pubescent annuals.

1. *G. lotoides* L. Sp. pl. ed. 2 (1762) 663; M. B. Fl. taur.-cauc. III, 330; Fenzl in Ldb. Fl. Ross. II, 153; Boiss. Fl. Or. I, 755; Grossg., Fl. Kavk. II, 85. — Ic.: Sibth. et Smith, Ic. Fl. graec. (1825) 472; Engl. et Drude Veget. d. Erde IX, I (1910) 238, tab. 207, f. E. K. — Exs.: Herb. Fl. cauc. no. 266.

Annual, with a slender root; plant pubescent throughout, covered with soft stellate and simple hairs; stems ascending or prostrate, often decumbent, 20—50 cm long, simple or branched, more or less terete, leafy; leaves clustered, petiolate, obovate or oblong-spatulate, 1.5—4 cm long and 0.5—1.5 cm broad, obtuse or rarely acuminate, entire; flowers axillary, crowded, the unequal pedicels ebracteolate; calyx parted nearly down to base; sepals ovate, ca. 7 mm long and 2.5—3 mm broad, on outer face densely covered with whitish stellate hairs with a dark median band and membranous margins; on inner face glabrous, white, reddish on the margin, distinctly banded; stamens 12, subulate, shorter than sepals; anthers elongated; staminodes linear, flat, bifid, acuminate; ovary ellipsoid, 5-grooved, glabrous; styles short, spreading; stigmas simple; capsule 5-angled, 5-valved, covered by the calyx; seeds numerous, rounded-reniform, black. July—October.

Inundated and waterlogged places. — Caucasus: E. Transc., Tal. **Gen. distr.:** Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from Sicily. Type in London.

Genus 457. **AIZOON**** L.

Loefl. ex L. Sp. pl. (1753) 403.

Calyx with a campanulate tube, deeply 5-parted, colored inside, persistent in fruit; corolla none; stamens numerous, alternating with sepals; ovary

* From Greek *glinos*, sweet juice.

** Name of an evergreen plant occurring in Pliny's writings.

5-celled; styles 5; capsule 5-angled, 5-valved, enclosed by the calyx. Annuals with succulent leaves.

1. *A. hispanicum* L. Sp. pl. (1753) 488; Fenzl in Ldb. Fl. Ross. II, 144; Boiss. Fl. Or. II, 765; Grossg., Fl. Kavk. II, 85. — Ic.: DC. Hist. des pl. grasses (1810) 30. — Exs.: Herb. Fl. Cauc. no. 265.

Annual, with a branched fibrous root; plant lepidote-glandular throughout; stem (3) 5—18 cm long, profusely branched; branches prostrate, terete, green; leaves sessile, half-clasping, borne at the base of branches, subopposite or verticillately approximate, elongate, obtuse, 1.5—4 (5) cm long, 3—5 (9) mm broad, thick, succulent, green, the margins slightly revolute; flowers axillary, solitary, sessile or short-pedicel, 1—1.5 cm long; sepals lanceolate, ca. 3 mm broad, twice the length of the calyx tube, the outer face green, the inner whitish; stamens united at base in groups of 2 or 3, borne between and shorter than the sepals; ovary rounded-pentagonal; styles 5, short, somewhat recurved; capsule 5-celled; seeds many in each cell, rounded-reniform. April—May. (Plate XIX, Figure 1 a).

Saline soils in deserts and semideserts. — Caucasus: E. Transc. **Gen. distr.:** W. and E. Med., Iran., Arabia. Described from Spain. Type in London.

Family LIX. **PORTULACACEAE** LINDL.*

Flowers perfect, the plants monoecious; calyx 2-parted, sometimes adnate at base to ovary, persistent or caducous; corolla of 5 (rarely 4—9), distinct or united; stamens 3—15; style 3—6-fid; ovary superior or half-inferior, 1-celled, with central placentation; capsule (2) 3—many-seeded, dehiscing by an operculum or by 3 valves; seeds with copious endosperm. Small annual or perennial herbs with entire leaves.

Key to Genera

- 1. Flowers yellow, sessile; capsule opening by a round lid 460. *Portulaca* L.
- + Flowers white or roseate, pedicel, capsule opening by 3 valves . . . 2.
- 2. Petals 5, 8—12 mm long; stamens 5 458. *Claytonia* L.
- + Petals 3, 2—3 mm long; stamens 3 459. *Montia* Michx.

Genus 458. **CLAYTONIA** ** GRONOV.
Gronov. ex L. Gen. pl. ed. I (1737) 339; L. Sp. pl. (1753) 204.

Calyx 2-parted, persistent; petals 5, free, short-clawed, inserted on the receptacle at the ovary base; stamens opposite the petals, the filaments adnate at base to the claws; ovary superior, containing 3—6 ovules; style 3-fid; capsule 3—6-seeded, opening by 3 valves; seeds flattened.

* Treatment by O. I. Kuzeneva.
** Named for the botanist John Clayton, who did most of his work in Virginia.

1. Taproot stout, globular or fusiform 2.
- + Taproot slender 3.
2. Taproot [corm]; more or less globular (Section 1. *Cormosae* A. Gray) 1. *C. tuberosa* Pall.
- + Taproot fusiform (Section 2. *Caudicosae* A. Gray). 5.
3. Annual plants, more rarely perennials. Rhizome mostly absent or very short (Section 5. *Limnia propria* A. Gray). . . 8. *C. sibirica* L.
- + Perennial plants with long horizontal rhizomes 4.
4. Cauline leaves 2, opposite, broad (Section 3. *Rhizomatosae* A. Gray) 6. *C. sarmentosa* C. A. M.
- + Cauline leaf 1, linear (Section 4. *Microclaytonia* Kuzen.) 7. *C. vassilievii* Kuzen.
5. Lower part of stem and base of petioles enveloped by broad membranous sheaths; leaves acute 2. *C. acutifolia* Pall.
- + Lower part of stem exposed 6.
6. Inflorescence bracteate; leaf thin, mostly linear or linear-lanceolate. 5. *C. eschscholtzii* Cham.
- + Inflorescence bractless; leaves firm, mostly elliptic or oboval . . . 7.
7. Stem (7) 10—25 cm long; sheaths of radical leaves triangular 4. *C. ioanneana* Roem. et Schult.
- + Stem to 10 cm long; sheaths of radical leaves semiorbicular. 3. *C. arctica* Adams.

Section 1. **CORMOSAE** A. Gray, Proc. Amer. Acad. XXII (1887) 278. — Taproot globular; radical leaves none or few; cauline leaves 2, opposite, oblong or linear; inflorescence ebracteate; pedicels recurved at base. Perennials.

1. *C. tuberosa* Pall. ex Willd. in Roem. et Schult. Syst. V (1819) 436; Hultén, Fl. of Kamtch. II, 62; Kom., Fl. Kamch. II, 74. — *C. virginica* β media Ldb. Fl. Ross. II (1844) 146.

Perennial; corm subglobose, somewhat flattened, 1—2 cm in diameter; stem solitary, slender, erect or somewhat flexuous, 15—25 cm long; cauline leaves 2, opposite, at or slightly above the middle of the stem, linear-oblong to oblong-lanceolate, pointed, regularly narrowing toward base, 2—6 (7) cm long, 2—6 mm broad, thickish; radical leaves wanting; racemes 3—10-flowered, erect; pedicels erect, becoming arched-recurved or pendulous in fruit, 2—3 cm long; lowest bract leaflike, oval, sessile, the upper bracts paired, small, membranous; sepals 2, green, divergent, oval, narrowly white-margined; petals 5, ca. 8 mm long, white, with a yellow blotch at base; stamens shorter than corolla; capsule ovaloid, 1-celled, shorter than calyx; seeds black, shining. June—July, beginning of August. (Plate XIX, Figure 4 a).

Sphagnum tundra; solitary or in groups. — Arctic: An.; E. Siberia: Lena-Kol. (Khatanga, Verkhoyansk); Far East: Kamch. Gen. distr.: N. Alaska. Described from Kamchatka. Type in London.

Economic importance. The corms are edible. In the Koryak National District they used to be collected in large amounts.



PLATE XIX. 1. *Aizoon hispanicum* L.: a) flower.— 2. *Phytolacca americana* L.: a) flower.— 3. *Mollugo cerviana* (L.) Ser.: a) and b) flower.— 4. *Claytonia tuberosa* Pall.: a) flower.— 5. *C. eschscholtzii* Cham.— 6. *Montia minor* Gmel.— 7. *M. lamprocarpa* Cham.

Section 2. *CAUDICOSAE* A. Gray in Proc. Amer. Acad. XXII (1887) 280. — Taproot fusiform, long; radical leaves numerous, petiolate; petioles dilated and membranous at base; radical leaves 2 or 3, opposite or alternate; inflorescence ebracteate or with numerous minute membranous bracts. Perennial plants.

2. *C. acutifolia* Pall. ex Willd. in Roem. et Schult. V (1819) 436; Ldb. Fl. Ross. II, 147; Hultén Fl. of Kamtch. II, 60; Kom., Fl. Kamch. II, 75.

381 Perennial; the stems and the numerous radical leaves enveloped at base by broad membranous sheaths; stems ascending or spreading, 8—10—20 cm long; radical leaves broadly lanceolate or linear-lanceolate, 5—18 cm long, (0.5) 1—1.5 cm broad, pointed, fleshy, the flat petiole dilated at base; cauline leaves 2, opposite, lanceolate, sessile; raceme loose; bracts on the lowest pedicel oval, pointed, to 1 cm long, on the upper pedicels minute, subulate, or wanting; sepals acute, 6—8 mm long; petals oboval, entire, large, bright rose. June—August.

Tundra and stony slopes of bald mountains. — Arctic: Arc. Sib. (E. part), Chuk., An.; E. Siberia: Lena-Kol.; Far East: Kamch., Okh. **Gen. distr.:** N. Am. Described from E. Siberia. Type in London.

3. *C. arctica* Adams in Mém. Soc. Nat. Mosc. V (1817) 94; Ldb. Fl. Ross. II, 143; Hultén, Fl. of Kamtch., 60; Kom., Fl. Kamch. II, 76. — Ic.: Hultén, l. c., tab. 2 e.

Perennial, with a fleshy fusiform taproot; radical leaves numerous, fleshy, thick, without distinct veins, oboval or spatulate-oblong, the long flat petioles dilated at base; stems numerous, resembling the basal leaves but not membranous-margined, the central mostly erect, the peripheral ascending to prostrate; radical leaves 2, mostly about the middle of the stem, oval, sessile; raceme few-flowered, before anthesis nodding, becoming erect; pedicels flat, ebracteate; sepals broadly elliptic, obtuse; petals oboval, slightly retuse, white or lurid, with a yellow blotch at base, 3 times as long as the calyx. June—July.

Arctic tundra and the alpine zone of N. Kamchatka. — Arctic: Arc. Sib.; E. Siberia: Lena-Kol. (N.); Far East: Kamch. Endemic. Described from the lower reaches of the Lena. Type in Leningrad.

4. *C. joanneana* Roem. et Schult. Syst. V (1819) 434; Ldb. Fl. Ross. II, 148; Kryl., Fl. Zap. Sib. V (1931) 982. — *C. acutifolia* Ldb. Fl. Alt. I (1829) 253. — Ic.: Ldb. Ic. pl. Fl. Ross. III, tab. 212 (sub *C. acutifolia*).

382 Perennial; taproot stout, 5—10 mm thick, long, fusiform; stems numerous, spreading or ascending, 7—25 cm long; radical leaves numerous, elliptic to oblong-elliptic, acute or obtuse, the long petioles dilated and membranous-margined at base, often roseate; leaves including petiole 5—20 cm long, 1—3 cm broad; radical leaves at or slightly above the middle of the stem, opposite, sessile, ovate or elliptic, pointed, 1.5—3 cm long and 1—1.5 cm broad; raceme terminal, simple; pedicels ebracteate; sepals suborbicular or rounded-reniform, concave, ca. 6 mm long and 8 mm broad; petals pale rose or white, about twice the length of the calyx, 11—13 mm long and 6—8 mm broad, broadly obovate, slightly retuse, short-petioled; stamens half as long as the petals, the filaments flat, slightly

dilated toward base; capsule almost exposed, equaling the calyx; seeds round, black, smooth, shining, ca. 3 mm in diameter. June—July.

The alpine zone of moss-and-lichen or gravelly lichen tundra, near glaciers and snow beds, on rocks and rock streams.—W. Siberia: Ob (SE), Irt. (E.), Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Dzu.-Tarb. Gen. distr.: Mong. Described from Siberia. Type in London.

5. *C. eschscholtzii* Cham. in *Linnaea* VI (1830) 561; Ldb. *Fl. Ross.* II, 147.

Perennial; taproot stout, 0.5—1.5 (2) cm thick, fusiform, reddish inside when dry; stems 1—4 or numerous, 8—15 (24) cm long, ascending; radical leaves numerous, linear to linear-lanceolate, obtusish, with a pronounced midrib, 5—15 (18) cm long, 2—3 (5) cm broad, thin and delicate, membranous at base; cauline leaves 2, linear-lanceolate, 1.5—2 (4) cm long, 2 mm broad; inflorescence sparsely flowered, bracteate; bracts rather small, narrow, pointed, 5—10 mm long; pedicels 3 times as long as the expanded flower; sepals ovate, ca. 5 mm long; petals obovate, slightly retuse, 3—4 times the length of the calyx, 10—12 mm long; stamens half as long as petals; capsule about the length of the calyx; seeds round, flat, black, shining, ca. 3 mm in diameter. June—August. (Plate XIX, Figure 5).

On bald mountains and passes in mossy bogs.—Arctic: Chuk.; E. Siberia: Lena-Kol.; Far East: Okh., Ze.-Bu. Endemic. Described from the Okhotsk District.

Section 3. *RHIZOMATOSAE* A. Gray in *Proc. Amer. Acad.* XXII, 280 (1887).—Rootstocks creeping or suckering; radical leaves long-petioled, the petioles dilated but not membranous at base; cauline leaves 2, opposite, broad, sessile; inflorescence almost bractless; pedicels ascending or erect at maturity. Perennial plants.

6. *C. sarmentosa* C. A. M. in *Mém. Soc. Nat. Mosc.* VII—Nouv. *Mém.* I (1829) 137; Ldb. *Fl. Ross.* II, 149; Hultén *Fl. of Kamtch.* II, 61; Kom., *Fl. Kamch.* II, 77.—Ic.: C. A. M., l. c., tab. 3; Hultén, l. c., tab. II, f. f.

383 Perennial; taproot fusiform-filiform, simple, covered at the top with remnants of dead leaves; stems 4—8 from one root, erect, the peripheral more or less ascending or prostrate, slender, 10—20 cm long; the axils of preceding year's leaves also bearing filiform offshoots 2—5 (10) cm long and terminating in a bud or developing a number of leaves; radical leaves numerous, to 8 cm long, oboval-spatular, obtuse-tipped, cuneate at base, the long petiole not dilated; cauline leaves 2, ca. 1 cm long, opposite, sessile, broad-ovate, point-tipped; inflorescence simple, 2—6-flowered, ebracteate; pedicels filiform, erect at anthesis, finally drooping; sepals 2, broad-ovate, ca. 5 mm long; petals 5, short-clawed, to 15 mm long, obovate, obtuse, pale rose, with darker raspberry-colored nerves; filaments subulate, with small anthers, surpassing the calyx; ovary elongate, with filiform styles. July—August.

Arctic: Chuk.; Far East: Kamch., Okh. Gen. distr.: the coast and islands of North America. Described from Saint George Island. Type in Leningrad.

Section 4. *MICROCLAYTONIA* Kuzen. — Rootstock long, slender, creeping, branched; radical leaves few or wanting, sessile, slightly dilated at base; cauline leaf 1, sessile; inflorescence with a single bract at base. Perennial plants.

7. *C. vassilievii* Kuzen. sp. nova in Addenda V, p. 668.

Perennial; rootstock long, slender, creeping, branched, giving rise to flowering stems as well as vegetative shoots; stems short, slender, 3–4 cm high including inflorescence; cauline leaf 1, sessile, linear, ca. 1 cm long and 1 mm broad, obtuse, amplexicaul at base; radical leaves 1–3 (more rarely wanting) and the leaves of sterile shoots linear, 15–30 mm long and 1–2 mm broad, obtusish; flowering raceme loosely 2–4-flowered, 1.5–2 cm long, subtended by a single broad-ovate foliaceous bract 4–5 mm long; pedicels recurved in fruit, rarely erect, (4) 10–15 mm long; sepals broad, (2.5) 3–4 mm long, roseate; petals whitish, 6–8 mm long; stamens surpassing the calyx; seeds round. June–July.

Eroded mountainous meadow-tundra. — Arctic: An. Endemic. Described from the Rarytkin Range. Type in Leningrad.

Section 5. *LIMNIA PROPRIA* A. Gray in Proc. Amer. Acad. XXII (1887) 280. — Leaves at inflorescence base numerous, petiolate; cauline leaves 2, opposite, sessile, often partially united. Annual or rarely perennial plants.

384 8. *C. sibirica* L. Sp. pl. (1753) 204; Ldb. Fl. Ross. II, 149; Hultén Fl. of Kamtch. II, 61; Kom., Fl. Kamch. II, 77.

Annual, more rarely perennial; root fibrous; stems erect or ascending, 20–40 cm long; radical leaves rhombic, ovate, or broadly elliptic, more rarely elongate, acute or rarely obtusish, the blade 2–5 cm long, 1.5–4 cm broad; petioles (6) 10–15 (18) cm long, marginate, dilated toward base; cauline leaves sessile or subpetiolate, obovate to broadly obovate, 2–4 cm long, 1.5–3 cm broad; inflorescence mostly solitary (rarely 2 or 3); lower bracts 1–1.5 cm long and 0.5–1 cm broad, the upper ones linear; pedicels alternate, slender, divergent, subsequently horizontally spreading or reclinate; sepals broad-ovate, obtusish, ca. 4 mm long; petals broadly obovate or oblong, 7–10 mm long, obtuse to retuse, white or rose; seeds ca. 2 mm long. June–August.

Damp valleys. — Far East: Komandorskie Islands. — Gen. distr.: N. Am. Described from Siberia (apparently from islands, since it has not yet been found on the continent). Type in London.

Genus 459. *MONTIA** MICH.

Mich. ex L. Syst. ed. 1 (1735).

Calyx 2-parted, herbaceous, persistent; corolla of 5 connate petals; split down on one side, with 2 larger and 3 smaller lobes; stamens 3, inserted at the base of the smaller corolla lobes; style short, 3-fid;

* Named for the Italian Monti, professor at Bologna at the beginning of the 18th century.

fruit a rounded capsule, not united at base with the calyx, (2) 3-seeded, 3-valvular, loculicidal, the valves curling up after dehiscence. Small annual or perennial plants with opposite leaves and small white flowers in terminal and spuriously lateral inflorescences.

1. Stems submersed, floating or prostrate 3. *M. rivularis* Gmel.
- + Stems erect 2.
2. Seeds coarsely and prominently tuberculate 1. *M. minor* Gmel.
- + Seeds finely tuberculate 2. *M. lamprosperma* Cham.

1. *M. minor* Gmel. Fl. Bad. I (1805) 301; Shmal'g., Fl. I, 166. — *M. fontana* var. *chondrosperma* Fenzl in Ldb. Fl. Ross. II (1844) 152. — Ic.: Hegi Fl. Mitt. Eur. III (1909) 270; Thomé Fl. Deutsch. II (1886) 1, 277; Fedch. and Fler., Fl. Evr. Ross. (1910) 366. — Exs.: Fl. ital. exs. no. 788; C. Billot Flora Gall. et Germ. exs. no. 131; Dörfler Herb. norm. no. 472.

385

Annual; stem divaricately branched, erect, 2.5—8 cm long, terete, glabrous; lower leaves spatulate to spatulate-elongate, 6—8 mm long and 2—3 mm broad, with petioles dilated at base, shining and succulent when young; upper leaves linear or lanceolate; inflorescences lateral and terminal, 2—5-flowered; pedicels flattened, enlarged below the flower, finally 5—7 mm long, sepals broadly spatulate, ca. 1.5 mm long; corolla ca. 2 mm long; capsule slightly overtopping the calyx; seeds 0.8—1 mm long, black, almost dull, strongly tuberculate. March. (Plate XIX, Figure 6).

Inundated fields. — Caucasus: W. Transc. Gen. distr.: S. Scand., Centr. Eur., Atl. Eur., Med., As. Min., Arm.-Kurd. Described from Germany. Type in Karlsruhe.

2. *M. lamprosperma* Cham. in Linnaea VI (1831) 565; Shmal'g., Fl. I, 166. — *M. fontana* var. *lamprosperma* Fenzl in Ldb. Fl. Ross. II (1844) 152; Kom., Fl. Kamch. II, 77. — Ic.: Linnaea ib. tab. VII, f. 2. — Exs.: HFR no. 415.

Annual; roots slender, filiform; plant glabrous throughout; stems slender, dichotomously branched, ascending, (2) 4—8 (12) cm long; leaves fleshy, oblong to oblong oval or linear-spatulate, 2—12 (15) mm long, 1—3 mm broad, yellowish at fruit ripening; flowers mostly in terminal 2—5-flowered racemes, rarely solitary or axillary; sepals ca. 1.5—2 mm long and 3 mm broad; corolla slightly overtopping the calyx; capsule also longer than calyx; seeds black, lenticular, finely reticulate, rather lustrous. May. (Plate XIX, Figure 7).

Shores, sandbars, peat bogs, and boggy meadows. — Arctic: Arc. Eur., Chuk.; European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. Dnp.; Far East: Kamch., Okh., Uss. Gen. distr.: Scand., Centr. Eur. (N. part). Described from Unalaska Island and Eschscholtz Bay. Type in Leningrad.

3. *M. rivularis* Gmel. Fl. Bad. I (1805) 301; Shmal'g., Fl. I, 166. — Ic.: Thomé, Fl. Deutsch. II (1886) 227; Syreishch., Fl. Mosk. gub. II (1907) 96. — Exs.: F. Petrak, Fl. Bohem. et Morav. no. 150.

Perennial; roots slender; stems decumbent, floating or submersed in water, furcately branched, rooting, 10—20 cm long; leaves rather thick, the lower spatulate, narrowing down to a petiole, to 2 cm long and to 5 mm

broad, the upper linear-oblong, smaller, green at fruit ripening; inflorescences terminal, mostly overtopped by elongated lateral branchlets and thus apparently lateral; flowers small; sepals broad-ovate, obtuse, ca. 1.5–2 mm long and 3 mm broad; corolla white, slightly overtopping the calyx; seeds shining, black, punctulate. May–June.

Banks of streams and rivulets; rare. — European part: Kar.-Lap. (very rare), Lad.-Ilm., U. V. **Gen. distr.:** Scand., Centr. Eur., Atl. Eur., W. Med., Bal. Described from Germany. Type in Karlsruhe.

386

Genus 460. **PORTULACA** L.

L. Gen. pl. ed. 5 (1754) 204.

Sepals 2, adnate to base of ovary, caducous; petals 5 (4–6), free or connate at base, united with the calyx; stamens 8–15, free or adnate at base to petals; style 3–6-fid; ovary half-inferior, many-ovuled; capsule 1-celled, many-seeded, circumscissile. Annual plants with prostrate stems and fleshy leaves.

1. *P. oleracea* L. Sp. pl. (1753) 445; Ldb. Fl. Ross. II, 143; Shmal'g., Fl. I, 166; Fl. Yugo-Vost. IV, 214. — Ic.: Hegi Fl. Mitt. Eur. III (1909) 270, tab. 98; Fl. Yugo-Vost. IV, ill. 297.

Annual; stem (7) 10–30 cm long, glabrous, fleshy, prostrate, mostly appressed to the soil or ascending, branched from base; leaves alternate, sessile, cuneately narrowing toward base, fleshy; flowers solitary or in clusters of 2 or 3, in the stem crotches or in the leaf axils; sepals herbaceous, obtusely keeled; petals obovate, yellow; stigmas linear; capsule ovoid or globular, 5–8 mm long. June–August.

Sand deposits on riverbanks, fields, weed-infested places around villages, and gardens. — European part: U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don; Caucasus: all regions; Far East: Uss., Kamch. (a single record); Centr. Asia: all regions except Dzu.-Tarb. **Gen. distr.:** Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran., Ind.-Him., Dzu.-Kash., Mong., Jap.-Ch. Described from Europe. Type in London.

Economic importance. Young stems and the plump young leaves are used in salads, as a potherb, or as a soup vegetable.

Family LX. **CARYOPHYLLACEAE** JUSS.*

Flowers actinomorphic, perfect, more rarely unisexual, 5- or (rarely) 4-merous, the perianth composed of calyx and corolla; sepals 5, free or connate, sometimes membranous; petals often unguicular, entire or divided, sometimes wanting; stamens 10, in two whorls, more rarely 5 or fewer; ovary superior, unilocular or basally 3–5-locular; carpels 5, rarely fewer by abortion; styles free or united; ovules numerous or more rarely few, borne on a central or basal placenta, with a distinct funiculus, amphitropous; fruit a capsule dehiscing apically by 3–10 valves or teeth, or indehiscent [utricle or achene], or more rarely a berry; seeds with endosperm and a

* Treatment by B. K. Shishkin, with the exception of that series of species mentioned in footnotes.

387 curved or more rarely almost straight embryo, globular or pyriform. Herbs or rarely undershrubs; leaves entire, opposite, often connate at base, very rarely alternate, sometimes stipulate; inflorescence cymose, either paniculate or racemiform, or flowers solitary.

Key to Subfamilies

- 1. Leaves stipulate Subfamily II. Paronychioideae Vierh.
- + Leaves exstipulate 2.
- 2. Sepals free or, if sometimes connate to the middle, then perianth single Subfamily I. Alsinoideae A. Br.
- + Calyx always with connate sepals, often tubular; perianth always double Subfamily III. Silenoideae Vierh.

Subfamily 1. **ALSINOIDEAE** VIERH. in Oesterr. botan. Zeitschr. LXII (1907) 96; Pax in Engl. u. Prantl, Nat. Pflanzenf. III, b. (1889) 69, ex parte. — Alsineae DC. in Lam. et DC. Fl. Franc. 3 ed. IV (1805) 766. — Characters in the Key.

Key to Tribes

- 1. Fruit mostly many-seeded, dehiscing as a rule by apical teeth Tribe 1. Alsineae Pax.
- + Fruit 1-seeded, indehiscent Tribe II. Scleranthaeae Vierh.

Tribe 1. **ALSINEAE** Pax in Naturl. Pflanzenf. III, 1 b (1889) 78. — Sepals free; styles free from base; fruit a capsule opening by teeth, mostly many-seeded; stipules wanting.

Key to Genera

- 1. Flowers of two kinds, some terminal and in upper leaf axils, chasmo-gamous, with calyx and corolla but sterile, others cleistogamous, with closed calyx, without corolla, fertile; taproot raphaniform or cormlike 462. Kraschennikowia Turcz.
- + Plants without cleistogamous flowers or cormlike roots 2.
- 2. Styles 3—5 3.
- + Styles 2 16.
- 3. Styles 4 or 5; petals as many as styles or none 4.
- + Styles 3 7.
- 4. Petals entire, much shorter (rarely longer) than calyx, obsolescent, or wanting; dwarf prostrate plants with linear leaves 466. Sagina L.

388

- + Petals 2-cleft or 2-lobed, rarely merely emarginate or entire but then much longer than calyx. 5.
5. Capsule opening by 8—10 teeth; petals entire; annual plants * *Moenchia* *
- + Capsule opening by 10 teeth; petals 2-fid. 6.
6. Capsule ovoid, opening to the middle by 5 valves, these 2-toothed and reflexed at tips; petals 2-cleft nearly to base, with linear divisions 463. *Malachium* Fries.
- + Capsule cylindric or oblong, opening by 10 equal teeth; petals lobed to one-third their length or entire. 464. *Cerastium* L.
7. Petals rather deeply 2-cleft or very rarely many-cleft or sometimes wanting 8.
- + Petals entire or but slightly notched or toothed 9.
8. Petals 2-cleft to the middle or nearly to the base, very rarely wanting 461. *Stellaria* L.
- + Petals lobed to one-third. 464. *Cerastium* L.
9. Sepals connate up to the middle; calyx turbinate; plants glabrous throughout, compactly pulvinate-matted. . . 475. *Thylacospermum* Fenzl.
- + Sepals distinct. 10.
10. Flowers in a terminal umbel subtended by bracts, toothed at apex; seeds scutate 465. *Holosteum* L.
- + Flowers differently disposed; petals entire, rarely notched; seeds commonly reniform 11.
11. Ovary and capsule 1-locular 12.
- + Ovary and inflated capsule 3—5-locular. 474. *Merckia* Fisch.
12. Capsule opening by 3 teeth. 13.
- + Capsule opening by 6 teeth. 15.
13. Capsule globose, few-seeded, the seeds 3.5 mm long; leaves ovate 471. *Ammodenia* Patr.
- + Capsule oblong, with smaller seeds; leaves linear-subulate 14.
- 389 14. Capsule 1-seeded; petals none; flowers in compact heads surrounded by stiff uncinat bracts 469. *Queria* L.
- + Capsule many-seeded; petals nearly always present. . . 470. *Minuartia* L.
15. Seeds smooth and lustrous, with a crestlike appendage [elaiosome] near the hilum; capsule opening to the middle by 6 twisted valves 473. *Moehringia* L.
- + Seeds tuberculate, dull, unappendaged; capsule opening by 6 small teeth 472. *Arenaria* L.
16. Sepals and petals 5; stamens 7—10; leaves lanceolate to linear-lanceolate; plants glandular-pubescent throughout 468. *Lepyrodiclis* Fenzl.
- + Sepals and petals 4; stamens 4—8; leaves subulate; plants glabrous. 17.
17. Capsule opening by 2 valves; sepals 3—5-nerved; pedicels shorter than calyx. 467. *Buffonia* L.
- + Capsule opening by 4 valves; sepals 1-nerved; pedicels slender, several times as long as calyx 461. *Stellaria* L.

* The occurrence of this genus in the USSR has not been ascertained. *M. mantica* (L.) Bert. was reported for Abkhazia (W. Transc.) but this report is not confirmed by later investigations.

Genus 461. **STELLARIA** * L.

L. Sp. pl. ed. I (1753) 421.

Sepals 5, rarely 4, persistent in fruit and appressed to capsule; petals 5, rarely 4, white, 2-cleft or distinctly notched, very rarely 5-10-cleft or obsolescent or wanting; stamens 10, rarely 8 or 4; styles 3, very rarely 2; capsule globose or ovoid, dehiscent to the middle or nearly to the base by 6 or more rarely 4 valves; seeds globular or reniform ovaloid, commonly compressed. Perennial or rarely annual plants with linear-lanceolate or ovate leaves. Russian: zvezdochka [little star].

1. Petals fimbriate 41. *S. radians* L.
- + Petals 2-cleft or none 2.
2. Styles 2; capsule dehiscing by 4 valves 3.
- + Styles 3; capsule dehiscing by 6 valves 7.
3. Glabrous annuals with linear leaves; stamens 4
- 50. *S. alsinoides* Boiss. et Buhse.
- + More or less hairy perennials; stamens 8-10 4.
4. Sepals and petals 5; stamens 10; stem 30-45 cm long
- 49. *S. kotschyana* Fenzl.
- + Sepals and petals 4; stamens 8; stem 4-12 cm long 5.
5. Leaves oblong-ovate, 5-7 mm long and 3 mm broad; flowers terminal and axillary (Altai) 46. *S. martjanovii* Kryl.
- + Leaves linear-oblong, 8-13 mm long and 1.5-2 mm broad (Central Asia) 6.
6. Petals 1.5 times as long as calyx, clothed with very short glandular hairs 47. *S. schugnanica* Schischk.
- + Petals shorter than calyx; leaves and calyx sparsely clothed with rather long hairs 48. *S. alexeenkoana* Schischk.
7. Leaves broad, ovate or rarely ovate-lanceolate, the lower long-petioled; stems terete, often pubescent only on one side of the internodes . . . 8.
- + All leaves sessile or nearly so; stems usually angled, very rarely terete 13.
8. Petals 1.5-2 times as long as calyx 9.
- + Petals as long as or shorter (very rarely just longer) than the calyx or wanting 11.
9. Stems with pubescence confined to one side of the internodes; leaves 2-3 cm long (Far East) 14. *S. ebracteata* Kom.
- + Stems uniformly pubescent; leaves 3-8 cm long 10.
10. Stems lanceolate, acute, broadly scarious-margined, pubescent at base, glabrous elsewhere; capsule oblong-cylindric, 1.5-2 times as long as calyx 12. *S. nemorum* L.
- + Sepals broad-ovate, obtusish, narrowly scarious-margined, pubescent up to the apex; capsule ovoid, about equaling or very slightly exceeding calyx 2. *S. bungeana* Fenzl.
11. Petals none or obsolescent; seeds small, 0.75-0.8 mm in diameter, sharply tuberculate 5. *S. pallida* (Dumort.) Piré.
- + Petals usually present, shorter than to as long as calyx; seeds more than 1 mm in diameter 12.
12. Stems 30-80 cm long; petals equaling calyx, very rarely obsolete; seeds sharply tuberculate 5. *S. neglecta* Weihe.

* From *Latinstella*, star.

- 391 + Stems usually not more than 30 cm long; petals shorter than the calyx or wanting; seeds bluntly tuberculate 3. *S. media* (L.) Cyr.
13. Flowers large; sepals 7–9 mm long; petals twice as long as calyx, 2-cleft to the middle; stem 20–40 cm long, brittle, hispid below the nodes; leaves lanceolate, rigid, long-acuminate, scabrous on margin and on midrib 10. *S. holostea* (L.).
- + Calyx 2–5 mm long, and if longer than plant differing from the preceding in other characters 14.
14. Capsule 1- or 2-seeded, much shorter than calyx; plants densely cespitose; leaves often imbricated, 4–5 mm long, with thickened margins; petals one-third to two-thirds as long as calyx 15.
- + Capsule 6- to many-seeded, usually exceeding calyx 17.
15. Plants low, compactly pulvinate-cespitose, with closely imbricated leaves; flowers solitary, borne on very short pedicels, commonly not rising above the matted growth (Arctic) 43. *S. dircanoides* Fenzl.
- + Plants not pulvinate; leaves linear or lanceolate; flowers rather long-pedicelled, commonly in groups of several. Mountains of Siberia and Central Asia 16.
16. Sepals obtuse, 2.5–3 mm long; petals none 44. *S. sibirica* (Rgl. et Til.) Schischk.
- + Sepals acute, 4–5 mm long; petals one-third to half as long as calyx 16a.
- 16a Stems 7–20 cm long, mostly hairy; leaves 10–20 mm long; loosely cespitose plants 43. *S. cherleriae* (Fisch.) Will.
- + Stem 2–7 cm long, mostly glabrous; leaves 4–8 mm long; compactly matted plants 42. *S. petraea* Bge.
17. Inflorescence umbelliform 18.
- + Inflorescence different from the above or flowers solitary 19.
18. Petals none; inflorescence spreading; stems 5–10 cm long; leaves acuminate 25. *S. umbellata* Turcz.
- + Petals very small; inflorescence contracted; stems 2–3 cm long; leaves obtuse 26. *S. irrigua* Bge.
19. Plant usually densely hairy throughout, often glandular 20.
- + Plant glabrous or partly hairy, never glandular 24.
20. Taproot stout, woody; stems profusely branched from base, sometimes forming spherical-bushy tops; indument mostly glandular 21.
- + Rootstock slender, creeping; stem branched at summit; indument consisting of simple hairs 23.
21. Sepals 6–8 mm long 7. *S. karatavica* (Lipsch.) Schischk.
- + Sepals 3.5–4.5 mm long 22.
22. Sepals lanceolate, acute, very narrowly membranous-margined, 4–4.5 mm long and 1–1.5 mm broad 6. *S. dichotoma* L.
- + Sepals ovate, obtuse or obtusish, broadly white-scarious-margined, 3.5–4 mm long and 1.5–2 mm broad 9. *S. amblyosepala* Schrenk.
- 392 23. Sepals 6–7 mm long, long-acuminate. Arctic, Far East 38. *S. eschscholtziana* Fenzl.
- + Sepals 4.5–5 mm long, obtusish or short-acuminate. Pam.-Al. and T. Sh. 9. *S. turkestanica* Schischk.
24. Sepals densely puberulous on the back 25.
- + Sepals glabrous on the back 26.

25. Capsule turning brown at base in maturity (Transbaikalia, Yakutia) 37. *S. laxmanni* Fisch.
+ Capsule green (N. of Eur. part and W. Siberia) 23. *S. hebecalyx* Fenzl.
26. Leaves (at least the young) sparingly covered above with recurved hairs. Lena-Kol. 39. *S. fischeriana* Ser.
+ Leaves glabrous above, glabrous or diffusely pubescent beneath 27.
27. Calyx 6—8 mm long; leaves cordate-ovate or broadly lanceolate, 2—3 cm long and 1—2 cm broad, rigid. Far East 37. *S. ruscifolia* Willd.
+ Calyx 2—5 mm long, rarely longer and then leaves different from above 28.
28. Bracts resembling the leaves, herbaceous, or wanting; flowers axillary 29.
+ Bracts scarious throughout or broadly scarious-margined 34.
29. Stems with pubescence confined to one side of the internodes 14. *S. ebracteata* Kom.
+ Stems glabrous, smooth, or minutely tuberculate on the ribs 30.
30. Leaves minutely tuberculate as well as ciliate on the margin; petals half as long as calyx or wanting 15. *S. calycantha* (Ldb.) Bong.
+ Leaf margin without tubercles or cilia; petals as long as or slightly shorter than calyx 31.
31. Very small plants, 2—5 cm high 32.
+ Larger plants, 5—20 cm high 33.
32. Leaves coriaceous, broadly or narrowly ovate, glaucescent; flowers solitary at the ends of stems, on stout pedicels; Chukchi area in the Arctic 40. *S. arctica* Schischk.
+ Leaves not coriaceous, grayish-green; flowers axillary, on slender pedicels 13. *S. winkleri* (Briq.) Schischk.
33. Capsule ellipsoid, 1.5—2 times as long as calyx; seeds rugose 11. *S. crassifolia* Ehrh.
+ Capsule as long as or scarcely longer than calyx; seeds smooth 12. *S. humifusa* Rottb.
34. Flowers in axillary cymes, on slender filiform pedicels; leaves undulate-margined 35.
+ Flowers in both terminal and axillary inflorescences; leaves usually not undulate-margined 36.
35. Leaves oblong-lanceolate; sepals ca. 3 mm long; petals one-third shorter than calyx; capsule equaling the calyx (northern USSR) 27. *S. alsine* Grimm.
+ Leaves ovate to broadly lanceolate; sepals ca. 4 mm long; petals and capsule very slightly exceeding calyx (Caucasus) 29. *S. anagalloides* C. A. M.
36. Leaves and stems echinulate; sepals 2—3 mm long; petals 3 mm long 37.
+ Petals 5—15 mm long, stems smooth, glabrous or more or less pubescent 38.
37. Petals broadly lanceolate, 6—12 mm broad 30. *S. fenzlii* Rgl.
+ Leaves lanceolate to linear-lanceolate, 2—4 mm broad 31. *S. diffusa* Willd.
38. Leaves ovate or broadly lanceolate, 4—8 mm broad 39.

- + Leaves linear-lanceolate, 1—4 mm broad 41.
- 39. Bracts large, ovate, broadly scarious-margined, ciliate; sepals ciliate 33. *S. ciliatosepala* Trautv.
- + Bracts small, not ciliate; sepals glabrous 40.
- 40. Inflorescences spuriously terminal, actually axillary; leaves commonly wavy-margined. Caucasus 28. *S. anagalloides* C. A. M.
- + Inflorescence terminal; leaf margins plain. East Siberia 24. *S. discolor* Turcz.
- 41. Pedicels long, often surpassing the lower leafy part of the stem; stem usually more or less hairy; capsule turning brown in maturity . . . 42.
- + Pedicels much shorter than the leafy part of the stem; capsule green (in *S. dahurica* turning brown) 44.
- 42. Leaves 3—6 cm long; calyx 5—7 mm long (Dzungarian Ala Tau and Tien Shan) 32. *S. soongorica* Roshev.
- + Leaves 1—3 cm long; calyx 4—5 mm long 43.
- 43. Leaves linear to lance-linear; pedicels very long. Alpine and Arctic regions of Siberia 31. *S. peduncularis* Bge.
- + Leaves ovate-lanceolate to lanceolate; pedicels short. Arc. Eur. and Dv.-Pech. 34. *S. edwardsii* R. Br.
- 44. Petals shorter than or rarely equaling calyx 45.
- + Petals slightly exceeding to 1.5 times as long as calyx 47.
- 45. Leaves without cilia at base 22. *S. fontana* M. Pop.
- 394 + Leaves sparsely ciliate at base 46.
- 46. Petals as long as or scarcely shorter than calyx; sepals ovate-lanceolate, 4—5 mm long 16. *S. graminea* L.
- + Petals one-half to two-thirds as long as calyx, sepals lanceolate, 5—8 mm long 19. *S. brachypetala* Bge.
- 47. Seeds more or less tuberculate; leaves often falcate 35. *S. dahurica* Turcz.
- + Seeds smooth; leaves straight 48.
- 48. Plants commonly clothed with soft curved hairs. Arc. Sib. 33. *S. ciliatosepala* Trautv.
- + Plants always glabrous except for the sometimes ciliate bracts . . . 49.
- 49. Dwarf plants, 3—5 cm high; stems ascending, subimbricately covered with lanceolate leaves and bearing 1 or 2 flowers 19. *S. imbricata* Bge.
- + Taller plants, 15—40 cm high; leaves remote; flowers more numerous 50.
- 50. Leaves 2—4 mm broad; plants usually glaucous . . . 20. *S. palustris* Ehrh.
- + Leaves 1—2 mm broad; plants green 51.
- 51. Bracts with glabrous margins (Caucasus) 21. *S. persica* Boiss.
- + Bracts ciliate (Far East) 17. *S. jaluana* Nakai.

Section 1. EUSTELLARIA Fenzl in Endl. Gen. (1840) 969. — *Spergularia* L. C. Rich. in Michx. Fl. bor.-amer. 1 (1803) 273. — *Micropetalon* Pers. Synops (1805) 509. — *Larbreia* St. Hil. in Mém. Mus. Paris II (1815) 287. — Subgen. *Eustellaria* Fenzl in Ldb. Fl. Ross. I (1842) 375. — Calyx 5- or more rarely 4-cleft; petals usually well developed; stamens 10, rarely 3—8; styles 3, rarely 2; ovary many-ovuled; capsule commonly many-seeded.

Series 1. Petiolares Fenzl in Endl. Gen. (1840) 969 (sub divisio). — All leaves, or at least the lower, distinctly petiolate, ovate or elliptic.

1. *S. nemorum* L. Sp. pl. (1753) 421; Shmal'g., Fl. I, 156; Shishk. in Fl. Yugo-Vost. IV, 250; Kryl., Fl. Zap. Sib. V, 939. — *S. nemorum* α subebracteata et β bracteata Fenzl in Ldb. Fl. Ross. I (1842) 375. — Ic.: Rechb. Ic. Fl. Germ. V, tab. 222. — Exs.: HFR no. 861.

395 Perennial; rootstock slender, long, creeping; stems to 60 cm long, weak, ascending, simple or more rarely branched, often glabrous in lower part, covered with crisp glandular hairs above; leaves cordate, acuminate, the lower rather broadly lanceolate, 3–8 cm long and 2–4 cm broad, smooth, ciliolate, petiolate, the upper small and sessile; flowers in axillary or terminal cymes; pedicels long, spreading or recurved after anthesis; sepals lanceolate, 5–6 mm long, broadly membranous-margined, glandular at base, glabrous and lustrous elsewhere; petals twice as long as calyx, 2-parted nearly to base, with linear lobes; capsule oblong, 1.5 times as long as calyx. May–July.

Wet shaded places in woods and near forest rivulets. — European part: Kar. -Lap., Dv. -Pech., Lad. -Ilm., U. V., V. -Kama, U. Dnp., M. Dnp., V. -Don, Transv., Bl. (?); Caucasus: Cisc., W. Transc. Gen. distr.: Scand., Centr. and Atl. Eur., W. Med. (N. part), Bal. -As. Min. Described from Europe. Type in London.

2. *S. bungeana* Fenzl in Ldb. Fl. Ross. I (1842) 376; Shishk. in Fl. Yugo-Vost. IV, 251; Kryl., Fl. Zap. Sib. V, 988. — *S. nemorum* Bge. in Ldb. Fl. Alt. II (1830) 152, non L. — *S. nemorum* β *bungeana* Rgl., Tent. Fl. Ussur. (1861) 28. — *S. nemorum* α *typica* *b. angustifolia* et *c. amurensis* Rgl. in Bull. Soc. Nat. Mosc. XXXV, 1 (1862) 268. — *S. nemorum* β *bungeana* *a. latifolia* et *b. angustifolia* Rgl., l. c. (1862) 269. — *S. nemorum* γ *stuebendorffii* Rgl., l. c. (1862) 270. — Ic.: Fl. Yugo-Vost. IV, ill. 299.

Perennial, with slender creeping rootstock; stems 20–50 cm long, weak, ascending, simple or branched, covered with multicellular partly glandular hairs; lower leaves ovate-oblong or ovate, acuminate, 3–8 cm long and 2–4 cm broad, smooth, minutely ciliolate; upper leaves small, sessile; flowers in axillary and terminal cymes; pedicels long, several times as long as calyx; sepals ovate, 4–6 mm long, obtuse, narrowly membranous-margined, obtuse, glandular on the back; petals 1.5 times as long as calyx, 2-parted nearly to base, the linear lobes slightly narrowing toward base; capsule ovoid, equaling or very slightly exceeding calyx. May–August. (Plate XX, Figure 1).

Shaded woods and gullies. — European part: Dv. -Pech., V. -Kama, Transv.; W. Siberia: all regions; E. Siberia: all regions; Far East: Ze. -Bu., Uda, Uss., Sakh. Gen. distr.: Mong., Jap. -Ch. Described from Siberia. Type in Leningrad.

3. *S. media* (L.) Cyr. Ess. pl. char. comm. (1784) p. XXXVI; Ldb. Fl. Ross. I, 377; Turcz. Fl. baic. -bahur. I, 228; Shmal'g., Fl. I, 157; Kryl., Fl. Zap. Sib. V, 990. — *Alsine media* L. Sp. pl. (1753) 272. — *S. media* β *oligandra* Fenzl in Ldb. Fl. Ross. I (1842) 377. — *S. media* var.

gymnocalyx Trautv. in A. H. P. I, 1 (1871) 33; V, 2 (1878) 415. — *S. media* subsp. *typica* Beguinot in Nuovo Giorn. Bot. Ital. no. 3, XVII (1910) 351. — *S. media* var. *trichocalyx* Trautv. in A. H. P. V, 2 (1878) 415. — *S. xanthanthera* Pobedimova in Bull. Jard. bot. princip. XXVIII (1929) 583. — Ic.: Rchb. Ic. Fl. Germ. V, tab. 222. — Exs.: HFR no. 1654.

Annual or biennial, with a slender branched taproot; stems 10–30 cm long, decumbent, partly ascending, branched, with a line of hairs on one side, glabrous elsewhere; leaves opposite, ovate, 1.5–2 cm long, ciliate at base, the upper sessile, the lower with a canaliculate petiole; inflorescence spuriously dichotomous; pedicels 1-sidedly hairy, 2–8 times as long as the calyx; sepals ovate-lanceolate, ca. 4 mm long, obtuse, glabrous on the back (var. *gymnocalyx* Trautv.) or diffusely pubescent in upper or lower part (var. *subgymnocalyx* Beg.) or hairy throughout (var. *trichocalyx* Trautv.); petals white, 2-parted, shorter than sepals, sometimes wanting; stamens 3–5 (var. *oligandra* Fenzl), rarely 10 or 0–2; capsule ovoid or oblong, surpassing calyx, dehiscing to the middle by 6 valves; seeds numerous, round or reniform, ca. 1.2 mm long and 1.3 mm broad, compressed, bluntly tuberculate on the margin. March–September. (Plate XX, Figure 2).

Vegetable gardens, weed-infested places, near houses, and sometimes damp wood margins. — European part: all regions; Caucasus: all regions; W. Siberia: all regions; E. Siberia: all regions; Far East: all regions; Centr. Asia: Mtn. Turkm., Syr D., Pam. Al., T. Sh. Gen. distr.: Centr. and Atl. Eur., W. Med., Bal.-As. Min., Ind-Him., Jap.-Ch., N. Am. Described from Europe. Type in London.

Economic importance. Readily eaten by livestock. Used as chicken food; also fed to domestic songbirds. A nectariferous plant.

4. *S. neglecta* Weihe in Bluff et Fingerh. Comp. Fl. Germ. ed. 1, I (1825) 560; Pobedimova in Izv. Gl. Bot. Sada XXVIII (1929) 579. — *S. neglecta* α *typica* Beg. in Nuovo Giorn. Bot. Ital. N. S. XVII (1910) 364. — *S. media* β *major* Koch, Syn. Fl. Germ. ed. 1 (1837) 118. — *S. media* α *decandra* Fenzl in Ldb. Fl. Ross. I (1842) 377. — Ic.: Rchb. Ic. Fl. Germ. V, tab. 222.

Annual or biennial; roots slender, branched; stems 30–80 cm long, decumbent or ascending, branched, brittle, with a line of hairs on one side, glabrous elsewhere; leaves opposite, to 3 cm long, broadly lanceolate, sessile, only the lowest petiolate; inflorescence spuriously dichotomous; pedicels 1-sidedly pubescent, 5–8 times as long as the calyx; sepals lanceolate, acuminate, more rarely obtusish, 5–7 mm long, more or less hairy on the back; petals white, about as long as calyx, rarely wanting, 2-fid at apex; stamens 10 or 6–8, more rarely 3–5; capsule ovoid or oblong, surpassing calyx, dehiscing to the middle by 6 valves; seeds numerous, round, compressed laterally, sharply tuberculate on the margin. April–June.

Weed-infested places, roadsides, damp ground, scrub, and woods. — European part: Crim.; Caucasus: all regions; Centr. Asia: Dzu.-Tarb., Mtn. Turkm., Syr D., Pam.-Al., T. Sh. Gen. distr.: Centr. and Atl. Eur., W. Med., Bal.-As. Min., Jap.-Ch. Described from Germany.

5. *S. pallida* (Dumort.) Piré in Bull. Soc. Bot. Belg. II (1863) 43. — Beg. in Nuovo Giorn. Bot. Ital. XVII (1910) 371. — *Alsine pallida* Dumort. Fl. Belg. (1827) 109. — *S. media* var. *capitata* Stapf in Denkschr. math.-nat. Klasse kaiserl. Akad. Wissensch. Wien LI (1886) 21. — Ic.: Lindmann, Svensk Fanerogamfl. (1918) 236.

Biennial, with slender branched roots; stems 10–25 cm long, ascending, branched from base, with a line of hairs on one side of the internodes; leaves ovate-lanceolate, small, commonly 5–8 mm or more rarely 1–1.5 cm long, glabrous, the lower petiolate, the upper and median sessile; flowers in cymes at the ends of stems and branches, sometimes crowded in a compact capitate cluster (var. *capitata* (Stapf) Schischk.); sepals commonly lanceolate, acuminate, more rarely ovate-lanceolate, subobtusely, rather densely pubescent, more rarely glabrous; petals none or obsolescent; stamens 1–3, rarely 5; styles very short; capsule oblong-ovoid, pointed, about equaling calyx; seeds round, light brown, 0.75–0.8 mm in diameter, compressed laterally, with pointed tubercles on the margin, the faces obscurely and minutely tuberculate. April–June.

Roadsides, stone walls, vineyards, and gardens. — European part: Bl., Crim.; Caucasus: Cisc., Dag., E. Transc.; Centr. Asia: Mtn. Turkm., Syr D. Gen. distr.: Scand., Centr. and Atl. Eur., W. Med. Described from Belgium.

Note. some authors consider *S. apetala* Ucria in Roem. Arch. I, 1 (1796) 68, as an independent species. This plant differs from *S. pallida* (Dumort.) Piré in the completely glabrous calyx, absolute absence of corolla, and absence of indument on the upper part of stems and on pedicels. We have been unable to detect in the herbarium of the Botanical Institute of the Academy of Sciences any plant that would conform to all the characters described. The species may possibly occur in the southern regions of the USSR.

Series 2. *Dichotomae* Roshev. — Petals 2-cleft; stems dichotomously branching, easily breaking at nodes, angled. Plants mainly associated with stony habitats.

6. *S. dichotoma* L. Sp. pl. (1753) 421; Fenzl in Ldb. Fl. Ross. I (1842) 378; Kryl., Fl. Zap. Sib. V (1931) 991. — *S. dichotoma* var. *schlechtendaliana* Schischk. in Kryl., Fl. Zap. Sib. V (1931) 992. — *S. schlechtendaliana* Ser. in DC. Prodr. I (1824) 399. — *S. pallasiana* Ser. l. c.; Bge. in Ldb. Fl. Alt. II, 153, ex parte. — *S. dichotoma* α *cordifolia* Bge. Fl. Alt. Suppl. (1836) 34; Fenzl in Ldb. Fl. Ross. I (1842) 379. — *S. dichotoma* β *ovata* Bge. Fl. Alt. Suppl. (1836) 34. — *S. dichotoma* var. *stephaniana* Rgl. in Bull. Soc. Nat. Mosc. XXXV, 1 (1862) 273; Kryl., Fl. Zap. Sib. V, 992. — *S. stephaniana* et *S. villosa* Willd. ex Schlecht. Mag. Ges. Naturf. VII (1816) 194. — *S. dichotoma* γ *lanceolata* et δ *oblonga* Bge. Fl. Alt. Suppl. (1836) 34. — *S. dichotoma* β *heterophylla* Fenzl in Ldb. Fl. Ross. I (1842) 397. — *S. dichotoma* δ *linearis* Fenzl in Ldb., l. c. (1892) 380. — Ic.: J. E. Smith, Ic. ined. I (1789) tab. 14.

Perennial; taproot cylindric, vertical, 5–15 mm thick and more than 20 cm long; stems numerous, dichotomously branched from base forming a spherical bushy plant to 30 cm high, terete, glandular-pubescent and

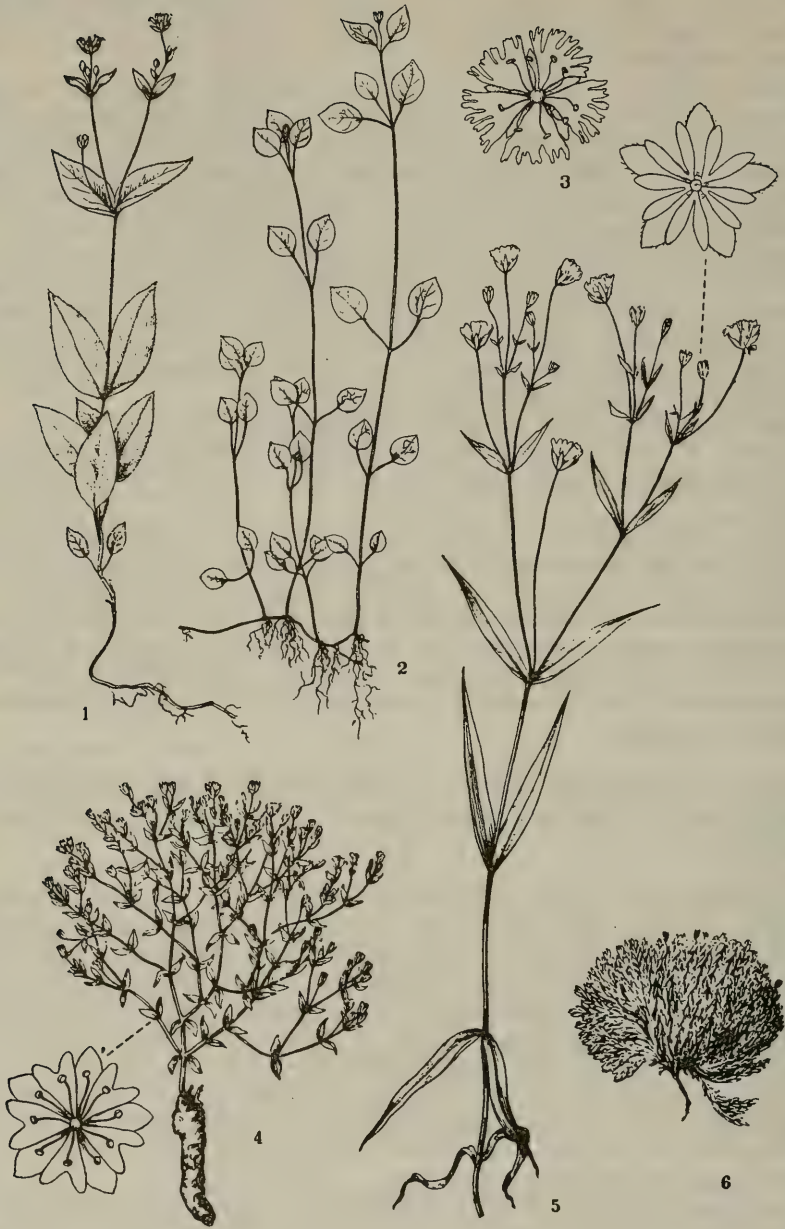


PLATE XX. 1. *Stellaria bungeana* Fenzl.— 2. *S. media* L.— 3. *S. radians* L.: flower.— 4. *S. dichotoma* L.: flower.— 5. *S. holostea* L.: flower.— 6. *S. dicranoides* Fenzl.

covered with long hairs, rarely glabrous; leaves numerous, sessile, more or less pubescent or smooth, 0.5–2 cm long and 12 mm broad, ovate, cordate at base, acuminate (var. *schlechtendaliana* (Ser.) Schischk.) or oblong-ovate, lanceolate, or linear-lanceolate (var. *stephaniana* (Willd.) Rgl.), the lower broad, the upper narrower; pedicels terminal or axillary, recurved in fruit; sepals lanceolate, acute, glandular-pubescent, narrowly scarious-margined, 4–4.5 mm long; petals as long as or slightly longer than calyx, cleft to one-third or one-half; capsule subglobose, ca. 3 mm in diameter, 2–5-seeded. (Plate XX, Figure 4).

Barren steppes and stony slopes. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Lena-Kol., Dau.; Far East: Ze.-Bu. (upper reaches of the Amur). Gen. distr.: Mong. Described from Siberia. Type in London.

7. *S. karatavica* (Lipsch.) Schischk. sp. nova in Addenda V, p. 880. — *Arenaria karatavica* Lipsch. in sched. — *S. dichotoma* β heterophylla Rgl. in sched. (non Fenzl); O. et B. Fedtschenko Consp. Fl. Turkest. I (1906) 134. — *S. serawschanica* M. Pop. in sched.

Perennial; stems numerous, to 15 cm long, branched, cylindric, puberulous, forming densely bushy plants; leaves sessile, narrowly lanceolate, acuminate, 1–3 cm long and 4–6 mm broad; flowers terminal or axillary, numerous, rather long-pedicel, pubescent on the back; petals slightly shorter than calyx, shallowly notched. May.

Mountain slopes. — Centr. Asia: Syr D. Endemic. Described from Karatau, at an altitude of 1500 m, 11 May, 1866, N. Severtsov; Zeravshan Valley, Dzhizmanskoe Gorge and Sangy-dzhumon Gorge, 2 and 25 May, 1869, Fedchenko. Type in Leningrad.

8. *S. amblyosepala* Schrenk, Enum. II Plant. nov. (1842) 54; Kryl., Fl. Zap. Sib. V (1931) 992. — *S. potanini* Kryl., Bot. mater. sobr. Potan. v. sost. ch. Semipalat. obl. (1891) 64. — *S. dichotoma* ϵ *rigida* Bge. Suppl. Fl. Alt. (1836) 34; Fenzl in Ldb. Fl. Ross. I (1842) 380. — *S. rigida* α typica Rgl. in A. H. P. V, 1 (1877) 252.

Perennial, clothed with short glandular hairs; taproot long, cylindric; stems numerous, 15–30 cm long, more or less spreading, forming a broad bushy top; leaves sessile, 0.5–2.5 cm long and 1.5–6 mm broad, lanceolate, acute; inflorescence terminal, divaricately dichotomous-paniculate; sepals ovate, obtuse or subobtuse, broadly hyaline-margined, 3.5–4 mm long and 1.5–2 mm broad; petals white, about as long as or slightly shorter than the calyx, cleft to the middle, with oblong-ovate obtuse divergent lobes; capsule shorter than calyx, globular-ovoid. May–July.

Rocks and stony desert-steppe slopes. — W. Siberia: Irt., Alt.; Centr. Asia: Balkh., Dzu.-Tarb. Endemic. Described from Dzungarian Ala Tau. Type in Leningrad.

9. *S. turkestanica* Schischk. in Trav. Mus. Bot. Acad. Sc. URSS, XXIV (1932) 31. — *S. rigida* β *latifolia* Rgl. in A. H. P. V (1877) 252. — Ic.: Schischk. ibid. tab. 1.

Perennial; rootstock slender, long, creeping; stems 5–10 cm long, ascending, densely leafy, glabrous in lower part, clothed in upper part with short crisp hairs, simple or branched; leaves elliptic or broad-ovate or

orbicular, 7–20 mm long and 4–12 mm broad, obtuse or rounded at apex, more rarely acuminate, densely puberulous, with a prominent midrib, narrowing or rounded toward base, sessile; pedicels puberulous, erect, arched-recurved, or somewhat nodding, 5–25 mm long; sepals 4.5–5 mm long, ovate to broad-ovate, subobtuse or short-acuminate, often suffused with reddish-purple, pubescent on the back, the margin white scarious; petals white, 1.5 times as long as calyx, cleft to one-third or one-half, with oblong lobes; capsule subglobose, 5- or 6-seeded; seeds reniform-rotund, 2.5 mm in diameter, covered with small tubercles. July–August. (Plate XXI, Figure 8).

Stony slopes and taluses. — Centr. Asia: Pam.-Al. Endemic. Described from the Mura Pass in the Zeravshan area. Type in Leningrad.

Note. Regel placed this species together with the Altai species under the name *S. rigida* (Bge.) Rgl., l. c. (*S. amblyosepala* Schrenk). However, the plant from the mountains of Soviet Central Asia has nothing in common with the Altai species and we have established it (l. c.) as a distinct species allied to *S. tibetica*. It has not been possible to retain the name *S. rigida* (Bge.) Rgl. for the plant under consideration, since Regel accepted as type the plant referred by Bunge to *S. dichotoma* as a variety, *β rigida* Bge. and later described by Schrenk as *S. amblyosepala*.

Series 3. *Holosteae* Fenzl in Endl. Gen. (1840) 969. — Leaves connate at base in pairs, lanceolate; bracts herbaceous; flowers large; sepals obscurely nerved.

402

10. *S. holostea* L. Sp. pl. (1753) 422; Fenzl in Ldb. Fl. Ross. I, 382; Shmal'g., Fl. I, 157; Shishk. in Fl. Yugo-Vost. IV, 252; Kryl., Fl. Zap. Sib. V, 993. — *Alsine holostea* Brit. Mem. Torr. Club V (1894) 150. — Ic.: Rchb. Ic. Fl. Germ. V, tab. 223. — Exs.: HFR no. 757. — Russian name: zvezdochka lantsetovidnaya [lanceolate].

Perennial, with creeping, branched rhizome and short sterile or long flowering stems, the latter 20–35 cm long, ascending, branched in upper part, 4-angled, commonly smooth, brittle; leaves narrowly lanceolate, long-acuminate, 4–9 cm long and 0.5–1.3 cm broad, the midrib sharply scabrous or hispidulous; inflorescence a rather loose cyme; pedicels long, puberulous; sepals smooth, without distinct nerves, ovate-lanceolate, acute, 7–10 mm long, very rarely 4–5 mm (var. *parviflora* Zing.); petals 2-cleft to the middle, twice as long as calyx; capsule subglobose, not exceeding calyx. April–July. (Plate XX, Figure 5).

Woods, forest margins, and scrub. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., L. Don; Caucasus: all regions; W. Siberia: Ob, Irt. Gen. distr.: Scand., Centr. and Atl. Eur., W. Med., Bal.-As. Min., Arm.-Kurd., N. Iran., N. Am. (introduced). Described from Europe. Type in London.

Economic importance. A nectariferous honey plant. Readily eaten by livestock.

Subsection LARBREAE Fenzl in Endl. Gen. (1840) 969. — Stems ribbed, ascending at base or erect; leaves sessile.

Series 4. Foliaceo-bracteatae Fenzl in Ldb. Fl. Ross. I (1842) 381. — Leaves broad, elliptic or ovate, more rarely lanceolate 1.5 — 3 times as long as broad; flowers small, to 4 mm long.

11. *S. crassifolia* Ehrh. Hannov. Magaz. VIII (1784) 116; Fenzl in Ldb. Fl. Ross. I, 383; Shmal'g., Fl. I, 158; Kryl., Fl. Zap. Sib. V, 994. — *S. humifusa* var. *caespitosa* f. *oxysepala* Rgl. ex O. A. et B. A. Fedtsch. Consp. Fl. Turk. I (1906) 134. — *Alsine crassifolia* Brit. Mem. Torr. Bot. Club V (1894) 150. — Ic.: Rchb. Ic. Fl. Germ. V, tab. 226, f. 4909b. — Exs.: Meinsh. Herb. Fl. Ingr. no. 110.

Perennial, with a slender creeping rhizome; stems 8 — 30 cm long, ascending, branched, more or less 4-angled, smooth; leaves sessile, thickish, narrowly or broadly elliptic-lanceolate (var. *linearis* Fenzl and var. *oblongifolia* Fenzl, respectively), 5 — 15 mm long and 1.5 — 5 mm broad; flowers terminal or axillary, in a rather loose forking inflorescence, on pedicels to 2.6 cm long; bracts herbaceous, with glabrous margin; sepals ovate-lanceolate, glabrous or slightly pubescent (var. *ericalycina* Schischk.), without distinct nerves, to 3.5 mm long; petals 2-parted almost to base, 1.5 times as long as calyx, 4.5 — 5 mm long and 2 mm broad; seeds concentrically rugulose, 0.75 — 1 mm long. May — August.

Bogs, damp meadows, in the south sometimes slightly solonchetic, and banks of small rivers. — Arctic: Arc. Eur., Arc. Sib., An.; European part: Kar. -Lap., Lad. -Ilm., Dv. -Pech., U. V., V. -Kama, U. Dnp., M. Dnp., V. -Don, Transv.; Caucasus: S. Transc.; W. Siberia: all regions; E. Siberia: all regions; Far East: Kamch.; Centr. Asia: Dzu. -Tarb., Syr D. (in mountains). Gen. distr.: Scand., Centr. Eur., Jap. -Ch., N. Am. Described from Germany. Type in Berlin.

12. *S. humifusa* Roth, Skrivt. Vidensk. Selsk. Kjobenh. X (1770) 447, tab. 4, f. 14; Fenzl in Ldb. Fl. Ross. I, 384; Kryl., Fl. Zap. Sib. V, 995. — *Arenaria thymifolia* Pursh, Fl. Am. Sept. (1814) 317. — *Alsine humifusa* Britt. Mem. Torr. Bot. Club V (1894) 150. — Ic.: Fl. Dan. VI, tab. 978. — Exs.: Fellman Pl. Arct. no. 49, 50.

Perennial, with a slender creeping rootstock; stems glabrous, prostrate, rooting at nodes, branched, 5 — 12 cm long; leaves oblong, acuminate, sometimes sublanceolate, sessile, thickish, 3 — 4 mm long, 1.5 — 2.5 mm broad, often with abbreviated branchlets in the axils; flowers rather few, short-pedicelled, scattered, axillary or terminal; bracts herbaceous, leaflike; sepals ovate-lanceolate, 3 — 3.5 mm long and ca. 1.5 mm broad, two-thirds as long as to slightly shorter than petals; capsule ca. 3 mm long, about equaling calyx, ovoid. June — August. (Plate XXI, Figure 2).

Polar-Arctic tundra, riverbanks and seacoasts, usually in sandy soil. — Arctic: Arc. Eur., Arc. Sib., Chuk.; European part: Kar. -Lap., Dv. -Pech.; W. Siberia: Ob; E. Siberia: Lena-Kol., Ang. -Say.; Far East: Kamch., Okh., Ze. -Bu. (?) Uda, Sakh. Gen. distr.: Arctic, N. Am. (Arctic). Described from Scandinavia. Type in Copenhagen.

13. *S. winkleri* (Briq.) Schischk. comb. nova. — *Cerastium winkleri* Briq. in Ann. Conserv. et Jard. Bot. Genève XIII — XIV (1911) 382. — *Cerastium schizopetalum* H. Winkl. in Videnskab Meddel. (1901) 51, non Maxim.

Perennial, matted; rootstock slender, creeping; stems glabrous, ascending, rooting at nodes, 2–3 cm long; leaves sessile, narrowly elliptic to linear-elliptic, acuminate, to 10 mm long and 2–3 mm broad; flowers solitary, on pedicels to 10–12 mm long; sepals lanceolate, acuminate, scarious-margined, 3–4 mm or more rarely ca. 2–2.5 mm long, obscurely nerved; petals about equaling calyx, 2-parted almost to base. July–August.

Damp places in the high mountain zone. — Centr. Asia: Pam.-Al. Endemic. Described from the Pamir (Belung-kul', at an altitude of 3,800 m, 30 August, 1898, no. 1193, O. Paulsen). Type in Copenhagen; cotype in Leningrad.

- 104 14. *S. ebracteata* Kom. in A. H. P. XVIII (1901) 441. — Ic.: Kom. in A. H. P. XXII (1904) tab. 3, 4.

Perennial; roots slender, filiform; stem solitary, simple, with a line of hairs on one side, slender, delicate, ascending or erect; leaves sessile or with very short petioles, thin, ovate-lanceolate to lanceolate, acuminate, 2–3 cm long and 0.4–1 cm broad, glabrous or with scattered hairs in lower part and on the margin; bracts none; flowers solitary, rarely paired, terminal, commonly long-pedicelated; sepals ovate-lanceolate, acuminate, scarious-margined, hairy; petals nearly twice as long as calyx, with a large apical notch, oblong-cuneate; anthers black; capsule shorter than calyx; seeds tuberculate. June.

River valleys, damp moss-covered places, and springs. — Far East: Ze.-Bu. Gen. distr.: N. Korea. Described from the Bureya Mountains. Type in Leningrad.

15. *S. calycantha* (Ldb.) Bong. Veg. Ins. Sitcha (1833) 127. — *Arenaria calycantha* Ldb. in Mém. Acad. Sc. Pétersb. V (1815) 534. — *S. borealis* Bigel. Fl. Bost. ed. II (1824) 182; Fenzl in Ldb. Fl. Ross. I (1842) 331. — *S. alpestris* Fries, Nov. Fl. Suec. Mant. I (1832) 10. — *Alsine borealis* Britt. Mem. Torr. Club. V (1894) 150. — *A. borealis alpestris* Britt., l. c. (1893). — Exs.: Pl. Finl. exsicc. no. 630.

Perennial; rootstock slender, creeping, branched; stems 10–20 (35) cm long, ascending, slender, 4-angled, slightly branched, glabrous or at summit puberulent; leaves sessile, ovate, elliptic-lanceolate, 2–4 cm long and 1–5 mm broad, thickish, the margin ciliate and beset with very short tubercles; flowers terminal, in a rather loose cyme; bracts herbaceous, glabrous; sepals ovate-lanceolate, acute or acuminate, 2.4–3.5 mm long, obscurely nerved; petals none (var. *apetala* Fenzl) or sometimes half as long as calyx, 2-cleft; capsule ovoid or oblong, 1.5–2 times as long as calyx; seeds dark brown, smooth or obscurely tuberculate, 0.8–1 mm in diameter. July–August. (Plate XXI, Figure 1).

Coniferous woods, banks of rivers and lakes, and pebbles. — Arctic: Arc. Eur.; European part: Kar.-Lap., Dv.-Pech.; Far East: Kamch., Okh., Sakh. Gen. distr.: Scand., N. Am. Described from the Far East. Type in Leningrad.

Note. Apparently hybridizing with *S. diffusa* Willd.

Series 5. Gramineae Roshev. Leaves narrowly lanceolate to linear, at least four times as long as broad.

16. *S. graminea* L. Sp. pl. (1753) 422; Fenzl in Ldb. Fl. Ross. I, 391; Shmal'g., Fl. I, 157; Kryl., Fl. Zap. Sib. V, 999. — *S. subulata* Boeber in Mag. Ges. Naturf. Freunde Berlin VII (1816) 195. — *Alsine graminea* Britt. Mem. Torr. Club V (1894) 150. — Ic.: Rchb. Ic. Fl. Germ. V, tab. 224. — Exs.: HFR no. 706. — Vernacular: p'yanaya trava [temulent herb].

Perennial; rootstock slender, branched, or profusely branched and small-flowered (var. *hippocotona* Czern.); stems 15–50 cm long, branched, ascending, 4-angled, smooth; leaves narrow, linear, acute (var. *lanceolata* Fenzl), to 4 cm long and 4 mm broad, ciliate-margined (var. *linearis* Fenzl) or broader, lanceolate to linear-lanceolate at base; inflorescence diffusely many-flowered; bracts scarious, ciliate; sepals elliptic-lanceolate, glabrous, 3-nerved, 3.5–5 mm long and 1–1.25 mm broad; petals as long as or slightly shorter than calyx, deeply 2-cleft, with linear lobes; capsule oblong, exceeding calyx; seeds finely roughened. May–July.

Meadows, fields and scrub. — European part: all regions; Caucasus: Cisc.; W. Siberia: all regions; E. Siberia: Yenisei, Ang.-Say, Dau.; Far East: Sakhalin (introduced?), also reported for other regions; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kyz. K., Syr D., Pam.-Al., T. Sh. Gen. distr.: throughout Europe, Dzu.-Kash., Mong., Tib. ? Described from Europe. Type in London.

Economic importance. Considered toxic to horses, especially in the southern regions of the European part. According to Chernyaev (Consp. Fl. Charkov.), var. *hippocotona* Czern. is particularly toxic.

17. *S. jaluana* Nakai in Bot. Mag. Tokyo XXVII (1913) 129 et in Fedde Repert. sp. nov. XIII (1914) 269. — *S. longifolia* Kom. Fl. Mansh. II, 170, p. p. (non Muehlb.).

Perennial, matted, with slender rootstocks; stem to 40 cm long, slender, 4-angled, scantily leafy; leaves linear, 1–2 cm long and ca. 1 mm broad, shorter than internodes, sometimes ciliate at base; flowers terminal or axillary in sparingly branched inflorescences, the straight slender 1-flowered branches 2–4 cm long; sepals 4–5 mm long, narrow, acuminate; petals much longer than calyx, 2-parted almost to base, with narrow lobes; stamens shorter than sepals, 3 mm long; capsule oblong, ca. 6 mm long; seeds 0.5 mm long, distinctly rugose. June–August.

Valley meadows. — Far East: Ze.-Bu., Uss. Gen. distr.: Jap.-Ch. Described from the Yalu River in N. Korea. Type in Tokyo.

18. *S. brachypetala* Bge. in Ldb. Fl. Alt. II (1830) 161; Fenzl in Ldb. Fl. Ross. I, 390; Kryl., Fl. Zap. Sib. V, 1000. — *S. graminea* δ *brachypetala* Rgl. in Bull. Soc. Nat. Mosc. XXXV, 1 (1862) 287. — ? *S. glauca* δ *altaica* Rgl., l. c. (1862) 225. — Ic.: Ldb. Ic. pl. Fl. Ross. V (1834) tab. 410.

Perennial; rootstock slender, creeping; stems 5–8 cm long, sprawling (var. *procumbens* Kryl.), or 13–25 cm long, erect or ascending (var. *erecta* Bge.); leaves 1–2 cm long and 1.5–4 mm broad, lanceolate to narrowly lanceolate, acuminate, commonly sparsely ciliate at base; inflorescence dichotomously divaricate, terminal, few-flowered; bracts white scarious; sepals lanceolate, gradually tapering to a slender point, distinctly nerved, white-scarious-margined, 5–8 mm long and 1.25–2 mm

broad; petals one-half to two-thirds as long as calyx, 2-parted almost to base, with linear-oblong lobes; capsule oblong, exceeding calyx. June—August.

Sand-and-pebble banks of mountain streams; also damp, sometimes solonchetic sites. — W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb., Pam.-Al. Gen. distr.: Dzu.-Kash., Mong. Described from the Chuya River in Altai. Type in Leningrad.

19. *S. imbricata* Bge. in Ldb. Fl. Alt. II (1830) 159; Fenzl in Ldb. Fl. Ross. I (1842) 389. — *S. palustris* var. *imbricata* Kryl. Fl. Alt. I (1901) 169; Fl. sib. occid. V, 998. — Ic.: Ldb. Ic. pl. Fl. Ross. V, tab. 419.

Perennial, loosely caespitose; rootstock slender, long-creeping; stems to 10 cm long, slender, 4-angled, ascending or semidecumbent; leaves somewhat overlapping, twice as long as internodes, ca. 10—11 mm long, oblong-lanceolate, subobtusate, glabrous, smooth, thickish; flowers terminal, solitary, rarely paired, on rather short pedicels; bracts ovate, scarious; sepals ca. 5 mm long, ovate, glabrous, broadly scarious-margined; petals 2-cleft, with ovate-oblong lobes, slightly exceeding calyx; capsule oblong-acuminate, 1.5 times as long as calyx, turning brown in maturity; seeds ca. 1.2 mm long, rounded-reniform, somewhat roughened. June—July.

Riverbanks and slopes in mountains. — W. Siberia: Alt. Endemic. Described from the Chuya River valley in Altai. Type in Leningrad.

20. *S. palustris* Ehrh. Beitr. V (1789) 176, nom. nud.; Retz. Fl. Scand. Prodr. ed. 2 (1795) 106; Kryl., Fl. Zap. Sib. V (1931) 997. — *S. glauca* With. Bot. Arr. Brit. pl. ed. 3, II (1796) 420; Fenzl in Ldb. Fl. Ross. I (1842) 389; Shmal'g., Fl. I, 157. — ? *S. dilleniana* Moench, Enum. pl. Haas. (1777) 214. — *Larbraea palustris* Fuss, Fl. Transs. (1866) 118. — *S. glauca* α *communis* Fenzl in Ldb. Fl. Ross. I (1842) 389; Kryl., Fl. Zap. Sib. V (1931) 998. — *S. palustris* var. *virens* G. F. W. Meyer Chloris Hannov. (1836) 198; Kryl., l. c.; Shmal'g., Fl. I (1895) 157. — *S. laxmanni* Bge. in Ldb. Fl. Alt. II (1830) 158, non Fisch. — *S. glauca* β *virens* Fenzl in Ldb. Fl. Ross. I (1842) 390, ex parte — *S. palustris* var. *fennica* Murrb. in Bot. Not. (1899) 206. — *S. palustris* var. *alpina* Kryl., l. c. — *Alsine glauca* Britt. in Britt. u. Brown. Ill. Fl. North. Un. Stat. ed. 2, II (1914) 44. — Ic.: Ldb. Ic. pl. Fl. Ross. V (1834) tab. 423 (sub *S. laxmanni* Bge.). — Exs.: HFR no. 657 (sub *S. glauca* With.).

407

Perennial; rootstock slender, branched; stems 20—45 cm long, rarely 10—12 cm (var. *alpina* Kryl.), ascending, usually simple, 4-angled, smooth, glaucous (var. *communis* Fenzl) or green (var. *virens* G. F. W. Mey.); leaves linear-lanceolate or linear, to 3 cm long, the lowest shorter and broader, glabrous, thickish, or (var. *fennica* Murrb. in northern regions) stem angles and leaf margin rough with minute warts; flowers in rather loose cymes, terminal; bracts scarious, glabrous; sepals 5—7 mm long, ovate-lanceolate, 3-nerved, acuminate, scarious-margined; petals about twice as long as calyx, rarely equaling or very slightly shorter than calyx (var. *parviflora* Nolte), 2-cleft to middle or beyond; capsule oblong-globular, about equaling calyx; seeds dark brown, somewhat roughened. June—July.

Bogs, boggy meadows, riverbanks, and sometimes solonchik meadows. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., L. Don; Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: Ob, Irt., Alt.; E. Siberia: all regions; Far East: (?) Centr. Asia: Balkh, Dzu.-Tarb., Syr D., Pam.-Al., T. Sh. Gen. distr.: Scand., Centr. and Atl. Eur., Med., Bal.-As. Min., Ind.-Him., Dzu.-Kash., Mong., Jap.-Ch. Described from Switzerland. Type in Göttingen.

21. *S. persica* Boiss. Diagn. ser. II, 1 (1853) 85. — *S. virens* (Fenzl) Rupr. Fl. Cauc. I (1868) 222. — *S. glauca* β *virens* Fenzl in Ldb. Fl. Ross. I (1842) 390, ex parte; Lipsky, Fl. Cauc. 252. — *S. glauca* Boiss. Fl. Or. I, 708. — *S. glauca* β *persica* Boiss., l. c. (1867) 708. — *S. stricta* C. Koch in Linnaea XV (1841) 707, non Sm. — *S. eciliata* Fenzl ex Rupr., l. c. (1868) 297. — *S. glauca* var. *laxmanni* Trautv. in A. H. P. II (1873) 513.

Perennial, glabrous and smooth throughout; stems erect or ascending, 15–40 cm long; leaves linear to lance-linear, 1–2.5 cm long and 1–2 mm broad; flowers in a loose cyme; pedicels rather long, slender, recurved in fruit; bracts scarious-margined or scarious throughout, lanceolate, the margin glabrous; sepals lanceolate, 4–6 mm long and 1–1.5 mm broad, acute, 3-nerved, scarious-margined; petals 1.5–2 times as long as calyx, the limb 2-parted almost to base, with linear-oblong lobes; capsule oblong, three-fourths as long as calyx; seeds brown, obscurely tuberculate, 0.75 mm long. July–August.

Boggy meadows and peaty lakeshores in the subalpine zone. — Caucasus: Greater Caucasus, E. and S. Transc. Gen. distr.: Arm.-Kurd., Iran. Described from Iran (Alwand). Type in Geneva.

22. *S. fontana* M. Pop. sp. nova in Addenda, V, p. 669.

Perennial, glabrous and smooth throughout; stem weak, ascending, 5–15 cm long, more or less branched; leaves lance-linear, 7–20 mm long and 1.5–3 mm broad, acute, narrowing toward base, green or glaucescent; flowers solitary or 3–5 together, terminal; pedicels 1–3 cm long, slender; bracts lanceolate, broadly scarious-margined or scarious throughout, 2–4 mm long; sepals ovate-oblong, 4–5 mm long and ca. 1.5 mm broad, acute, broadly scarious-margined, glabrous; petals white, 2-parted almost to base, as long as, exceeding, or scarcely shorter than calyx. June–July.

Banks of small streams in the alpine and subalpine zones. — Centr. Asia: Pam.-Al. Endemic. Described from Shakhryzabs. Type in Leningrad.

Note. The species established by M. G. Popov was described from badly preserved specimens. Since, however, it cannot be identified with any of the known species, we have included it in the Flora. The specimens from Shakhryzabs, on which the description was based, show a resemblance to material collected at some other locations in Pam.-Al.

23. *S. hebecalyx* Fenzl in Rupr. Fl. Samojed. Cisural. (1845) 26; Shishk. in Fl. Yugo-Vost. IV, 253; Kryl., Fl. Zap. Sib. V, 996. — *S. glauca* var. *lasiosepala* Meinsh. in Linnaea XXX (1860) 500. — *S. graminea* ϵ *hebecalyx* Rgl. in Bull. Soc. Nat. Mosc. XXXV, 1 (1862) 287. — *S. pono-jensis* A. Arrh. in Bot. Notis. (1888) 190 et Meddel. Soc. pro f. et fl. fenn. LVI (1891) 192–198.

Perennial; rootstock slender, creeping; stems ascending, branched, 4-angled, smooth, to 35 cm long; leaves narrowly lanceolate to linear-lanceolate, 1-nerved, glabrous, smooth, to 2.5 cm long and 3–8 mm broad; flowers in a terminal dichasium; pedicels long, smooth; bracts scarious, eciliate like the leaves; sepals oblong-lanceolate, softly pubescent in upper part, ciliate-margined in lower part; petals slightly exceeding calyx, to 6 mm long, 2-cleft; capsule oblong, nearly twice as long as calyx. July–August.

Riverbanks and inundated meadows. — European part: Kar.-Lap., Dv.-Pech., V.-Don, U. V., V.-Kama, Transv.; W. Siberia: Ob; E. Siberia: Lena-Kol. Endemic. Described from NE Europe. Type in Leningrad.

Series 6. *Discolores* Schischk. — Leaves oblong-lanceolate, mostly 3 times as long as broad, glaucescent beneath.

24. *S. discolor* Turcz. in Bull. Soc. Nat. Mosc. (1838) 88; XV (1842) 601; Fenzl in Ldb. Fl. Ross. I, 389.

409 Perennial; rootstock slender, creeping, branched; stems 10–40 cm long, branched, glabrous, 4-angled; leaves oblong-lanceolate, glabrous, firm, somewhat coriaceous, to 5 cm long and to 8 mm broad, sometimes acuminate, green above, glaucescent beneath; flowers terminal in a rather loose cyme; pedicels fairly long; bracts very small, lanceolate, acuminate, ca. 2–3 mm long; sepals narrowly ovate-lanceolate, long-acuminate, ca. 5–6 mm long, glabrous; petals slightly shorter than calyx, 2-lobed; capsule narrowly oblong, the length of calyx. June–August.

Damp meadows. — Far East: Ze.-Bu., Uss.; E. Siberia: Dau. Gen. distr.: Mong., Jap.-Ch. Described from Dauria. Type in Leningrad.

Series 7. *Umbellatae* Schischk. — Inflorescence umbellate. Small high-mountain plants.

25. *S. umbellata* Turcz. in Bull. Soc. Nat. Mosc. (1838) 89, nomen; ej. in Bull. Soc. Nat. Mosc. XV (1842) 173; Fenzl in Ldb. Fl. Ross. I, 394; Kom., Fl. Kamch. II, 87; Hultén, Fl. of Kamtch. II, 67; Kryl., Fl. Zap. Sib. V (1931) 1002.

Perennial; rootstock slender, with numerous fibrous roots; stems numerous, 5–15 cm long, ascending, slender, smooth; leaves elliptic or oblong, acute, 5–15 mm long and 2–7 mm broad, smooth, sometimes long-ciliate at base; inflorescence terminal, umbellate, subtended by an involucre of several scarious bracts; umbel simple or compound, subcymose; pedicels 1.5–4 cm long, slender, divaricate, in fruit often recurved; sepals ovate, acuminate, glabrous, smooth, ca. 2.5 mm long, obscurely nerved; corolla none; stamens 10; capsule ovoid, twice as long as calyx; seeds smooth. June–July.

Banks of rivers and lakes, grass plots, stony slopes, and taluses, in the alpine and subalpine zones. — W. Siberia: Alt.; E. Siberia: Ang.-Say.; Far East: Kamch.; Centr. Asia: Dzu.-Tarb., T. Sh. Gen. distr.: Mong., N. Am. Described from the Nukhu-daban Range. Type in Leningrad.

26. *S. irrigua* Bge. in Mém. prés. à l'Acad. Sc. Pétersb. par div. sav. II, 6 (1835) 548; Fenzl in Ldb. Fl. Ross. I (1842) 393; Kryl., Fl. Zap. Sib. V, (1931) 1002.

Perennial; stem 2—3 cm long, simple, glabrous, smooth; leaves ovate-oblong, obtuse, slightly tapering toward base; inflorescence terminal, contracted, subcymose, 3—7-flowered; pedicels filiform, somewhat elongating and recurving in fruit; bracts scarious; sepals ovate-lanceolate, acute; petals very minute, ca. 0.5 mm long, 2-cleft, with filiform lobes; stamens 10, about as long as calyx. July.

Damp moss tundra in the alpine zone. — W. Siberia: Alt. Endemic. Described from mountains near the Chuya River. Type in Paris.

Series 8. *Uliginosae* Schischk. — Flowers in an axillary few-flowered cymes; leaves with more or less crisped margins. Plants of boggy meadows.

410 27. *S. alsine* Grimm. in Nov. Acta Leopold. III (1767) 313; Hoffm. Deutschl. Fl. I (1791) 153; Bge. in Ldb. Fl. Alt. II (1830) 157. — *S. uliginosa* Murr. Prodr. Stirp. Goetting. (1770) 55; Fenzl in Ldb. Fl. Ross. I, 393; Kryl., Fl. Zap. Sib. V, 1001. — *Larbreia uliginosa* Rchb. Ic. Fl. Germ. V (1841) 36. — *Alsine uliginosa* Britt. Mem. Torr. Club. V (1894) 150. — Ic.: Rchb., l. c., tab. 226, f. 3639. — Exs.: HFR no. 1655 (var. *planifolia* Fenzl).

Perennial; rhizome slender, creeping, branched; stems 10—45 cm long, branched, 4-angled, decumbent, more or less ascending; leaves 5—15 mm long, oblong-lanceolate, sessile, commonly ciliate at base, flat (var. *planifolia* Fenzl) or crisp-undulate-margined (var. *undulata* Fenzl); inflorescences axillary few-flowered cymes; bracts scarious, glabrous; pedicels fairly long; sepals lanceolate, ca. 3 mm long and to 1 mm broad, distinctly 3-nerved, narrowly hyaline-margined; petals one-third as long as calyx, deeply 2-cleft, with linear lobes; capsule equaling calyx, ovoid. May—August.

Bogs, riverbanks, springs, more rarely damp shaded places. — Arctic: Arc. Eur.; European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don; W. Siberia: Ob (W.). Gen. distr.: Scand., Centr. and Atl. Eur., Med., Bal.-As. Min., N. Am. Described from Germany.

28. *S. anagaloides* C. A. M. ex Rupr. Fl. Cauc. (1869) 212.

Perennial; rootstock slender, creeping; stems 10—15 (—25) cm long, erect or prostrate, 4-angled, glabrous; leaves ovate-lanceolate, 1—2.8 cm long, 0.4—1 cm broad, acuminate, the margin somewhat wavy; inflorescence axillary or terminal, rather loosely cymose, few-flowered; bracts scarious; pedicels recurved in fruit; sepals ovate-lanceolate, acuminate, rather obscurely nerved, scarious-margined, ca. 4 mm long; petals equaling or very slightly exceeding calyx, deeply 2-cleft, the lobes linear-oblong; capsule oblong-elliptic, slightly exceeding calyx, whitish in maturity; seeds brownish, subglobose, notched, finely roughened. June—August.

Damp meadows in the subalpine zone. — Caucasus: Cisc., Dag., W. and E. Transc. Endemic. Described from N. Caucasus. Type in Leningrad.

Series 9. *Parviflorae* Schischk. — Flowers small; calyx 2.5—3 mm long.

29. *S. diffusa* Willd. ex Schlecht. in Magaz. Ges. Naturf. Freunde Berlin VII (1816) 195. — *S. friesiana* Ser. in DC. Prodr. I (1824) 395; Shmal'g., Fl. I, 158. — *S. longifolia* Fries in Liljebl. Svensk. Fl. ed. 3 (1816) 713; Fenzl in Ldb. Fl. Ross. I, 392 (non Mühlb.); Kryl., Fl. Zap. Sib. V, 1000; Asch. et Gr. Syn. V, 1 (1919) 560. — *S. mosquensis* M. B. ex Schlecht., l. c. (1816) 195; Kom., Fl. Kamch. II, 89. — *S. ingrica* Meinsh. in Sched. Herb. Fl. Ingr. no. 113. — *S. longifolia legitima* Rgl. in Bull. Soc. Nat. Mosc. XXV, 1 (1862) 288. — Exs.: HFR no. 256; Fries, Herb. Norm. II (sub *S. frieseana* Ser.). — Ic.: Syreishch., Fl. Mosk. gub. II, 124.

Perennial, loosely caespitose; rootstock slender; stems 15–30 cm long, weak, branched, ascending, mostly 4-angled; leaves green, linear, tapering toward base, 1.5–3 cm long and to 4 mm broad (the lower), with abbreviated branchlets in the axils; inflorescence very lax, dichasial; pedicels elongated; bracts scarious; sepals 2.5–3.0 mm long, obscurely nerved, ovate-lanceolate; petals as long as calyx, 2-cleft to the middle; capsule about twice as long as calyx, oblong-ovoid, turning brown in maturity; seeds ca. 1 mm long, oblong-reniform, dark brown.

Woods, damp shaded places, and banks of small rivers. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., V.-Kama, U. V., U. Dnp., L. Don (N. part), Transv.; W. Siberia: all regions; E. Siberia: all regions; Far East: all regions. Gen. distr.: Scand., Centr. Eur., Jap.-Ch., N. Am. Described from plants collected by Pallas in Siberia. Type in Berlin.

30. *S. fenzlii* Rgl. in Bull. Soc. Nat. Mosc. XXXV (1862) 280; Kom., Fl. Kamch. II, 85. — *S. borealis* α *corollina* Fenzl in Ldb. Fl. Ross. I (1842) 282. — *S. borealis* β *corollina lusus sachalinensis* Rgl. in Ind. sem. Hort. Petrop. (1863) 33. — *S. sachalinensis* Takeda in Bot. Magaz. XXIV (1910) 257. — *S. lancifolia* Kom. Fl. Penins. Kamsch. II (1929) 86, ex parte.

Perennial; rootstock slender, procumbent, whitish, branched; stems numerous, 13–30 cm long, slender, more or less 4-angled; leaves sessile, lanceolate or elliptic-oblong, 3–5 cm long and 6–12 mm broad, thin, pale green, rather long-acuminate, the margin and midrib somewhat hairy; flowers small, in terminal or sometimes axillary dichotomously branched cymes; bracts minute, herbaceous, scarious-margined, linear-lanceolate; pedicels long; sepals ovate-lanceolate, 3 mm long, scarious-margined, obscurely nerved; petals narrow, about as long as calyx, inconspicuous, 2-lobed; capsule ovoid, twice as long as calyx, 6-valved; seeds light brown, pitted. June–August.

Shady woods, rocks, landslides, and pebbles, especially near the sea. — Far East: all regions except Uss. and Ze.-Bu. — Endemic. Described from De-Kastri Bay. Type in Leningrad.

Series 10. *Pedunculares* Schischk. — Pedicels long; stems clothed with crisp hairs; capsule turning brown in maturity.

31. *S. peduncularis* Bge. in Ldb. Fl. Alt. II (1830) 157. — *S. longipes* var. *peduncularis* Fenzl in Ldb. Fl. Ross. I (1842) 387; Kryl., Fl. Zap. Sib. V, 996. — *S. longipes* auct. Fl. Ross. (non Gold.) ex parte. — Ic.: Ldb. Ic. pl. Fl. Ross. V, tab. 421.



PLATE XXI. 1. *Stellaria calycantha* (Ldb.) Bong.— 2. *S. humifusa* Rottb.— 3. *S. soongorica* Roshev.: a) flower, b) petal with stamens.— 4. *S. peduncularis* Bge.— 5. *S. cherleriae* (Fisch.) Williams.— 6. *S. edwardsii* R. Br.— 7. *S. ruscifolia* Willd.— 8. *S. turkestanica* Schischk.

Perennial, loosely tufted, more rarely densely so (var. *caespitosa* Roshev.); rootstock slender, creeping; stems 7–15 cm long, slender, simple or sparingly branched, 4-angled, the lower internodes sometimes somewhat hairy; leaves linear to lance-linear, acuminate, 1-nerved, sparsely hairy at base, the lowest abbreviated and broader; inflorescence terminal, dichasial, 1–4-flowered; pedicels long, erect; bracts scarious or herbaceous, broadly scarious-margined; sepals ovate-lanceolate, acuminate, obscurely 3-nerved, scarious-margined, sometimes ciliate, ca. 3–3.5 mm long; petals about twice as long as calyx, deeply 2-cleft; capsule oblong, twice as long as calyx, almost black in maturity; seeds almost smooth on the margin. June–August. (Plate XXI, Figure 4).

Riverbanks, stony slopes, taluses, in subpolar tundra and the alpine zone of mountains. — Arctic: Arc. Eur., Arc. Sib., An.; W. Siberia: Ob, Alt.; E. Siberia: Yenys., Ang.-Say., Lena-Kol, Dau.; Far East: Okh. Endemic. Described from Altai. Type in Leningrad.

32. *S. soongorica* Roshev. sp. nova in Addenda V, p. 669.

Perennial, very loosely tufted, or stems solitary; rootstock slender, creeping; stem 15–20 cm long, more or less 4-angled, simple or sparingly branched, ascending, slender, glabrous or somewhat lanate; leaves narrowly linear-lanceolate, long-acuminate, flat, to 6 cm long and 4 mm broad, glabrous, smooth, the midrib and marginal veins somewhat thickened; flowers terminal or axillary, few or solitary; pedicels 4–6 (8) cm long; bracts lanceolate, acuminate, at least the margin scarious; sepals 5, ovate-lanceolate, acuminate, ca. 5 mm long, white-scarious-margined, obscurely nerved, glabrous; petals white, slightly longer than calyx, 2-parted almost to base, with oblong-lanceolate lobes, obtuse; stamens with filaments dilated at base and dark gray anthers ca. 1–1.25 mm long; capsule oblong-ovoid, slightly longer than calyx, dehiscing by 6 valves, dark brown in maturity; seeds oblong-globular, slightly compressed laterally, finely tuberculate-rugulose, dark brown. June–August. (Plate XXI, Figure 3).

415

Mountain slopes in the spruce forest zone. — Centr. Asia: Dzu.-Tarb., T. Sh. Gen. distr.: Dzu.-Kash. Described from E. Kazakhstan. Type in Leningrad.

33. *S. ciliatosepala* Trautv. in Middend. Reise 1, 2 (1856) 52. — *S. graminea* var. *stricta* Trautv. in A. H. P. V, 2 (1878) 514. — Ic.: Trautv., l. c., tab. 8.

Perennial; rootstock rather slender, creeping or obliquely ascending; stems solitary or several, 5–15 cm long, irregularly covered with rather long soft curved hairs, simple or at flowering branched; leaves ovate-lanceolate to lanceolate, rarely ovate, 6–20 mm long and 2.5–4 mm broad, acute, sessile, with a prominent midrib, clothed with soft hairs or glabrous; flowers in a lax few-flowered umbelliform terminal inflorescence or solitary; pedicels 7–25 mm long, commonly glabrous; bracts scarious, in forks of inflorescence, rather large, 5–6 mm long, the upper smaller; sepals ovate, 3–4 mm long, obtusish, broadly scarious-margined, glabrous or very rarely puberulous on the back; petals 1.5–2 (3) times as long as calyx, 2-parted almost to base, with oblong lobes; capsule ovoid, exceeding calyx, darkening in maturity. July–August.

Sandy and stony shallows and sandy scarps in tundras. — Arctic: Arc. Sib., Chuk., An. Endemic. Described from the Taimyr Peninsula. Type in Leningrad.

34. *S. edwardsii* R. Br. in Parry's Voy. App. (1824) p. CCLXXI. — ?
S. floribunda Fisch. ex DC. Prodr. I (1824) 399. — *S. longipes* Fenzl (non Gold.) in Ldb. Fl. Ross. I (1842) 386, ex parte; Kryl., Fl. Zap. Sib. V (1931) 995, ex parte. — Ic.: Hook. Fl. bor. am. I (1833) tab. XXXI; Fl. Dan. XIII (1840) tab. 2290.

Perennial; rootstock creeping, branched; stems 3–7 (–10) cm long, ascending, glabrous or puberulent, 4-angled; leaves ovate-lanceolate to narrowly lanceolate, to 1.5 cm long and 0.4 cm broad, entire, 1-nerved, lustrous; flowers solitary, rather large, long-pedicelated; sepals ovate-lanceolate, acuminate, 3–4 mm long, 3-nerved, scarious-margined; petals 2-cleft to one-third their length, slightly exceeding calyx; capsule 1.5 times as long as calyx (fruit rarely set); anthers purple; seeds-pectinately tuberculate on the margin. June–September. (Plate XXI, Figure 6).

Riverbanks, stony tundra, and slopes. — Arctic: Arc. Eur.; European part: Dv.-Pech. Gen. distr.: Arc. Eur., N. Am., Greenland. Described from N. Am. Type in London.

416

35. *S. dahurica* Willd. ex Schlecht. Mag. Ges. Naturf. Freunde VII (1816) 195; Fenzl in Ldb. Fl. Ross. I, 388; Kryl., Fl. Zap. Sib. V, 997. — *S. falcata* Ser. in DC. Prodr. I (1824) 398, ex parte; Turcz. Fl. baic.-dah. I, 232. — *S. velutina* Ser., l. c. (1824) 397. — *S. glauca* α *dahurica* Rgl. in Bull. Soc. Nat. Mosc. XXXV (1862) 293.

Perennial, glabrous throughout (var. *glabrata* Fenzl) or hairy (var. *villosa* Fenzl), sometimes leaves and partly stems glaucescent (var. *glaucescens* Schischk.); rootstock slender, branched, stoloniferous; stems 3–12 (–25) cm long, profusely branched at base, ascending, densely leafy, smooth or sometimes puberulent below the nodes; leaves narrowly lanceolate to linear-lanceolate, acute, ciliate especially at base, 10–20 mm long and 1–4 mm broad; flowers in terminal cymes, 4–10 together; pedicels strongly recurved in fruit; all bracts scarious or the lower herbaceous; sepals ovate-lanceolate, acute, slightly shorter than petals; petals deeply 2-cleft; capsule oblong, about twice as long as calyx; seeds finely tuberculate. June–July.

Banks of mountain streams, cedar-and-larch forests, desert steppes, and sometimes solonchik meadows. — E. Siberia: Dau., Lena-Kol. Gen. distr.: Mong. Described from Dauria. Type in Berlin.

Note. Krylov, in his Flora of West Siberia, reports *S. dahurica* Willd. for the Altai. The Altai specimens that we have seen in the Herbarium of the Botanical Institute of the Academy of Sciences belong to *S. brachy-petala* Bge. or *S. peduncularis* Bge. This species should therefore be excluded from the Flora of Altai.

36. *S. laxmanni* Fisch. ex Ser. in DC. Prodr. I (1824) 397.

Perennial; rootstock slender, branched; stems ascending or erect, 10–20 cm long, 4-angled, glabrous or sparsely covered with crisp hairs; leaves linear-lanceolate, glabrous or sparingly covered with crisp hairs,

1—2 cm long and 2—3 mm broad; flowers in terminal few-flowered cymes; bracts lanceolate, almost wholly scarious; sepals ovate-lanceolate, ca. 4 mm long, acute, 3-nerved, densely puberulous all over the back or merely at summit; petals deeply 2-cleft, somewhat longer than calyx; capsule oblong, 1.5—2 times as long as calyx, turning black in maturity; seeds slightly roughened. June—July.

Forest grass plots, sparse woods and wood margins, depressions in steppes, and sandy banks of small rivers. — E. Siberia: Dau., Lena-Kol. Endemic. Described from E. Siberia. Type in Leningrad (?).

417 Note. An insufficiently clarified species. The plant illustrated in Leb., Ic. pl. Fl. Ross. under the name *S. laxmanni*, is *S. palustris* Ehrh. Ruprecht (Fl. Caucasi, p. 222), who reexamined the plants preserved in the Pallas herbarium used by Fischer in describing this species, indicates the pubescent calyx as a distinguishing feature of *S. laxmanni*. As regards this character, *S. laxmanni* Fisch comes very close to *S. hebecalyx* Fenzl. However, in the East Siberian specimens, the capsule darkens in maturity, while in the case of *S. hebecalyx* it remains green. In habit and other characters the species closely resembles *S. dahurica* Willd., from which it is distinguishable only by the pubescent calyx.

Series 11. *Ruscifoliae* Roshev. — Leaves coriaceous, broad, ovate-lanceolate or broadly lanceolate; seeds tuberculate on the back.

37. *S. ruscifolia* Pall. ex Schlecht. in Berl. Magaz. (1816) 194; Fenzl in Ldb. Fl. Ross. I, 385. — Ic.: Mioshi et Makino, Pocket-Atlas, Alp. Pl. Jap. I, tab. 15, f. 88 (1900).

Perennial, very loosely caespitose; rootstock branched, slender; stems 4—25 cm long, glabrous like other parts, erect or ascending, branched, forming a bushy top; leaves cordate-ovate or broadly lanceolate, rigid, with prominent midrib, 2—3 cm long and ca. 1.2 cm broad; flowers axillary or terminal in 1—6-flowered cymes, rather large, long-pedicel; sepals ovate, long-acuminate, 6—7 mm long, glabrous; petals as long as calyx, 2-cleft; capsule slightly exceeding calyx, oblong-ovoid, 8—9 mm long; seeds dark brown, the margin finely pectinate-papillose. July—August. (Plate XXI, Figure 7).

Seashore sands, more rarely riverbanks. — Arctic: An.; E. Siberia: Lena-Kol. (along the Aldan River); Far East: Kamch., Okh., Uda, Uss., Sakh. Gen. distr.: Jap.-Ch. Described from the vicinity of Udscoe. Type in Berlin.

38. *S. eschscholtziana* Fenzl in Ldb. Fl. Ross. I (1842) 384. — *S. eschscholtziana* α *typica* et β *tomentosa* Rgl. in Bull. Soc. Nat. Mosc. XXXV, 1 (1862) 300. — *S. ruscifolia* var. *eschscholtziana* Hultén, Fl. Kamtch., II (1928) 71. — Ic.: Hultén, l. c., Pl. I, fig. e, f, g.

Perennial, more or less canescent, with a small bushy top; rootstock creeping slender, profusely branched; stems 2—15 cm long, decumbent or ascending, more rarely erect, sparingly branched; leaves with prominent midrib; flowers few, axillary or terminal, solitary, rather long-pedicel, or in a loose cyme 1—6 cm long; sepals lanceolate, long-acuminate,

pubescent, white-scarious-margined, to 7 mm long; petals much longer than calyx, 2-cleft to the middle, with oblong-linear lobes; capsule ovoid, exceeding calyx. June—August.

Taluses in the alpine zone and mountain stream pebbles.— Arctic: An.; Far East: Kamch. Gen. distr.: Kurile Islands. Described from Kamchatka. Type in Leningrad.

39. *S. fischeriana* Ser. in DC. Prodr. I (1824) 398.— *S. florida* Fisch. ex DC., l. c. (1824) 399; Fenzl in Ldb. Fl. Ross. I, 385.

Perennial, loosely caespitose; rootstock creeping; stems numerous, 7–13 cm long, slender, simple, rather distinctly 4-angled, glabrous or slightly pubescent; leaves oblong-lanceolate to narrowly lanceolate, long-acuminate, 1-nerved, with thickened and sometimes somewhat revolute margins, always rather densely covered above with curved hairs, glabrous beneath, sometimes pruinose (var. *pruinosa* Roshev.); inflorescence terminal, simple, 1–3-flowered; pedicels long; bracts scarious-margined; sepals ovate-lanceolate, acuminate, glabrous, to 5 mm long; petals about twice as long as calyx, deeply 2-cleft, with linear-oblong lobes; capsule oblong, somewhat exceeding calyx; seeds with pectinately tuberculate margin. June—August.

Mountain valleys, on sandy and pebbly deposits.— Arctic: An., Chuk.; E. Siberia: Yenisei, Lena-Kol., Ang.-Say.; Far East: Kamch. (?). Endemic. Described from the Aldan River. Type in Leningrad.

40. *S. arctica* Schischk. sp. nova in Addenda V, p. 669.

Perennial, matted, sometimes subpulvinate; stems numerous, 4-angled, glabrous, 3–5 cm long, their lower part densely subimbricately leafy; leaves coriaceous, ovate, 5–9 mm long and 3–4 mm broad, acute, sessile, glabrous or sparingly ciliate at base, glaucescent, sometimes violet-tinged; pedicels stoutish; glabrous, 10–20 mm long; flowers in the axils of the uppermost pair of leaves, solitary or very rarely in pairs; sepals ovate, 3.5–4 mm long, with prominent midrib and slender lateral nerves, subcarinate, obtusish, the broad scarious margin ciliate; petals white, 6.5–7 mm long, 2-parted almost to base, with ovate acute or obtusish lobes; stamens 10, inserted on a glandular disk; ovary ovoid; styles 3; ovules numerous. July—August.

Pebbly coastal shallows, at 69.5–71°N. lat.— Arctic: Chuk.; Cape Schmidt, Wrangel Island. Endemic. Described from Cape Schmidt (Cape Severnyi or, according to Kjellmann, Irkapij). Type in Leningrad.

Section 2. *FIMBRIPETALUM* Turcz. Fl. baic.-dahur. I (1842) 236.— *Insignes* Fenzl in Ldb. Fl. Ross. I (1842) 78 ex parte.— Petals palmatisect with 5–10 divisions; capsule globose, somewhat exceeding calyx, many-seeded.

41. *S. radians* L. Sp. pl. (1753) 422; Ser. in DC. Prodr. I, 30; Ldb. Fl. Ross. I, 378; Turcz. Fl. baic.-dahur. I, 237; Kryl., Fl. Zap. Sib. V, 991.— *Cerastium fimbriatum* Ldb. in Mem. Acad. Petersb. V (1815) 540.— Ic.: Ldb. Ic. pl. Fl. Ross. V, tab. 413; Kom. and Alist., Opređ. rast. Dal'nevost. kr. I, tab. 141, f. 1.

Perennial; rootstock slender, creeping; stems 40–60 cm long, erect or ascending, ribbed, sparingly branched in upper part, short-pilose in lower part, densely covered above with soft hairs; leaves sessile, broadly lanceolate, 3–10 cm long and 1.5–2.5 cm broad, more or less covered with slender appressed hairs; flowers in a terminal paniculate inflorescence, rarely solitary (var. *uniflora* Ser.); bracts herbaceous, leaflike, but smaller; pedicels long, appressed-pubescent; sepals ovate or oblong-elliptic, obtuse-tipped, 6–7 mm long, pubescent; petals about 1.5–2 times as long as calyx, palmately fimbriate, with 5–10 linear divisions; capsule ovoid, somewhat exceeding calyx. June–July. (Plate XX, Figure 3).

Meadows at bog margins, river sands and pebbles; a weed of ricefields.— E. Siberia: Ang.-Say., Yeniss., Dau., Lena-Kol.; Far East: Kamch., Okh., Uda, Sakh., Ze.-Bu., Uss. Gen. distr.: NE Mongolia, Jap.-Ch. Described from Siberia. Type in London.

Note. This plant has been reported for W. Siberia (Baraba) on the basis of Falk's old records. Now that the floristic composition of W. Siberia is well known, Falk's report must be considered as erroneous.

Section 3. *ADENONEMA* (Bge.) Fenzl in Endl. Gen. (1840) 969. — Gen. *Adononema* Bge. Suppl. Alt. (1836) 36. — Sepals 5; petals very small; stamens 10; styles 3; ovary many-ovuled; capsule 1- or 2-seeded. Pulvinately matted plants.

42. *S. petraea* Bge. in Ldb. Fl. Alt. II (1830) 160. — *Adenonema petraeum* α *alpinum* Bge. Suppl. Fl. Alt. (1836) 36. — *Stellaria petraea* γ *imbricata* Fenzl in Ldb. Fl. Ross. I (1842) 395. — *S. petraea* var. *alpina* Turcz. in Bull. Soc. Nat. Mosc. XV (1849) 609. — *S. cherleriae* var. *typica* Williams in Bull. Herb. Boiss. 2 ser. VII (1907) 830. — *S. cherleriae* var. *alpina* Schischk. in Kryl. Fl. Sibir. occ. V (1931) 1003. — Ic.: Ldb. Ic. pl. Fl. Ross. V, tab. 401.

Perennial; taproot stout, multicapital; stems numerous, ascending or erect, leafy, smooth, very sparsely pubescent, 2–7 cm long, forming a very compact mat 3–5 cm in diameter; cauline leaves lanceolate to lance-linear, 4–8 mm long and ca. 1.5 mm broad, glabrous or sparsely pubescent, acute, rigid, sometimes falcate, with thickened margins, subimbricately approximate to subremote, with axillary leaf fascicles; flowers in umbelliform 3–12-flowered terminal cymes or sometimes solitary; sepals lanceolate, 4–5 mm long and 1–1.25 mm broad, acute, glabrous; petals deeply 2-cleft, with linear lobes, one-third to two-thirds as long as calyx; capsule subglobose, tapering toward base, 1- or 2-seeded, shorter than calyx. July–August.

420 Gravelly slopes, rocks, and placers in the alpine zone. — W. Siberia: Ang.-Say. (Munkū-sardyk); Centr. Asia: Dzu.-Tarb., T. Sh. (very rare). Gen. distr.: Mong. Described from mountains at the upper reaches of the Ul'ba and Chuya rivers. Type in Leningrad.

43. *S. cherleriae* (Fisch.) Williams in Bull. Herb. Boiss. 2 ser. VII (1907) 830, partim. — *Arenaria cherleriae* Fisch. ex Ser. in DC. Prodr. I (1824) 409 cum var. α *uniflora* Fisch. et β *fasciculata* Fisch.,

1. c. — *Adenonema petraeum* β *cherleriae* Bge., Suppl. pl. Alt. (1836) 37. — *S. davurica* Spreng. Syst. Veget. II (1825), non Willd. — *S. petraea* β *tenuifolia* lusuz 2 Fenzl in Ldb. Fl. Ross. I (1842) 395. — *Adenonema petraeum* α *fasciculatum* Bge. Suppl. Fl. Alt. (1836) 37. — *Stellaria petraea* α *vegeta* Fenzl in Ldb. Fl. Ross. I (1842) 394; Maxim. Prim. Fl. Amur. 60. — *S. petraea* β *fasciculata* Turcz. Fl. baic.-dah. I (1842) 238; Rgl. in Bull. Soc. Nat. Mosc. XXXV, I (1862) 303. — *S. cherleriae* var. *fasciculata* Williams in Bull. Herb. Boiss. II, ser. VII (1907) 833, ex parte.

Perennial; taproot 2–4 mm thick, ascending; stems several to numerous, becoming woody at base, ascending, (5) 7–20 cm long, clothed with soft crisp hairs, branched in the inflorescence, very rarely simple and 1-flowered (var. *uniflora* Fisch.); leaves linear or oblong-spatulate, 10–20 mm long and 1–2.5 mm broad, acute, tapering toward base, soft-ciliate especially in lower part, subtending sterile shoots reduced to leaf fascicles; flowers in few-flowered cymes forming a corymbose inflorescence; bracts leaflike, herbaceous, scarious-margined; sepals narrowly ovate, 4 mm long and 1.2 mm broad, acute, glabrous; petals one-fourth to half as long as calyx, 2-parted almost to base, with linear lobes; capsule 2-seeded, about half as long as calyx; seeds reniform-globular, somewhat roughened, 1–2 mm in diameter. June–July. (Plate XXI, Figure 5).

Grassy, gravelly or stony slopes, and dry or gritty steppes. — E. Siberia: Ang.-Say. (Krasnoyarsk), Dau. **Gen. distr.:** Mong. (?). Described from Transbaikalia. Type in Geneva.

Note. Until now *S. cherleriae* (Fisch.) Williams has been combined with *S. petraea* Bge. We find this practice unacceptable, considering that *S. petraea* is a plant of the alpine zone from Altai to the Eastern Sayans, while *S. cherleriae* grows on gravelly foothill slopes and is distributed from the Yenisei steppes to Dauria. The plant from the alpine zone of the Sayans is not quite identical with the Altai plant, but the available material is insufficient to justify separation.

44. *S. sibirica* (Rgl. et Til.) Schischk. comb. nova. — *Cherleria sibirica* Rgl. et Til. Fl. Ajan. (1859) 72. — *Stellaria cherleriae* var. *apetala* Williams in Bull. Herb. Boiss. ser. II, VII (1907) 832.

Perennial; taproot stout, woody, multicapital; stems numerous, becoming lignified at base, densely leafy, 3–7 cm long, glabrate; leaves linear to linear-lanceolate, 3–7 mm long and 0.5 mm broad, acute, glabrous, diffusely ciliolate, curved when dry; flowering stems with 1 or 2 pairs of leaves, minutely puberulous; pedicels slender, 5–10 mm long, erect, minutely puberulous; sepals lanceolate, obtuse or obtusish, 2.5–3 mm long, 3-nerved, puberulous or glabrate; petals none; stamens 10, of these 5 glandular at base; capsule dehiscent nearly to base by 3 valves. August.

Stony mountain slopes. — Far East: Okh. Endemic. Described from Ayan. Type in Leningrad.

45. *S. dicranoides* Fenzl in Ldb. Fl. Ross. I (1842) 395. — Ic.: Seemann, Bot. Voy. Herold (1852) tab. 3.

Perennial, densely pulvinate; stems branched from base, completely covered by overlapping leaves; leaves 4–5 mm long and 1–1.25 mm broad, glabrous, oblong-spatulate to lanceolate, tapering toward base, 1-nerved,

subcanaliculate, more or less fleshy, appressed to stem, marcescent and becoming scarious; flowers solitary, on glabrous pedicels 4–5 mm long, but slightly exserted from leaves; sepals oblong-lanceolate, ca. 3 mm long, 1-nerved; petals 2-cleft to the middle, one-half to two-thirds as long as calyx. Augst. (Plate XX, Figure 6).

Polar tundra. Arctic: Chuk. **Gen. distr.:** Ber. Described from the shores of Lavrentiya Bay. Type in Leningrad.

Section 4. *LEUCOSTEMMA* (Benth.) Fenzl in Endl. Gen. (1840) 969. — *Gen. Leucostemma* Benth. in Wallich. Numer. List. (1828) no. 642; G. Don. Gen. Hist. I (1831) 449. — Sepals and petals 4; styles 2; ovary many-ovuled. Perennials.

46. *S. martjanovii* Kryl. in A. H. P. XXI (1902) 3; Kryl., Fl. Zap. Sib. V (1931) 1003. — Ic.: Kryl., l. c. (1902) tab. I, f. 2.

422 Perennial, covered throughout with glandular hairs; rootstock long, filiform, procumbent, branched, with underground stolons 5–12 cm long giving rise to erect stems; stems 3–6 cm long, densely leafy, simple or somewhat branched; leaves approximate, sessile, oblong-ovate, acuminate, 1-nerved, 5–7 mm long and ca. 3 mm broad; inflorescences axillary or terminal, equaling or slightly overtopping the leaves, recurved after anthesis; sepals 4, ovate-lanceolate, acute, narrowly scarious-margined, ca. 4 mm long and 2 mm broad; petals 4, 1.5–2 times as long as calyx, ca. 6 mm long and 4 mm broad, 2-cleft to two-thirds their length, with oblong-obovate lobes; stamens 8; capsule ovoid, dehiscing to base by 4 valves, slightly exceeding calyx. June–July.

Barren southern gravelly crumbling slopes in the subalpine zones. — W. Siberia: Alt. Endemic. Described from the Chuya Alps. Type in Tomsk.

47. *S. schugnanica* Schischk. sp. nova in Addenda V, p. 670.

Perennial, loosely cespitose; roots long, slender, whitish; stems numerous, weak, ascending, 4–10 cm long, glabrous in lower part, sparsely glandular-pubescent above; leaves linear-oblong, 5–13 mm long and 1.5–2 mm broad, flat, acutish, bright green, sparsely glandular-pubescent or glabrous, commonly surpassing the internodes; flowers terminal, solitary; pedicels 5–10 mm long; sepals 4, ovate, 4 mm long and 1.5 mm broad, acute, obscurely 3-nerved, narrowly scarious-margined, glandular-pubescent on the back; bracts herbaceous; petals 4, white, 1.5 times as long as calyx, cleft to the middle, with oblong round-tipped lobes; stamens 8, of these 4 glandular at base; ovary 8–10-ovuled; capsule unknown. July–August.

Taluses in the alpine zone. — Centr. Asia: Pam.-Al. Endemic. Described from Shugnan. Type in Leningrad.

48. *S. alexeenkoana* Schischk. sp. nova in Addenda V, 670.

Perennial, loosely cespitose; roots rather long, slender; stems numerous, weak, ascending, glabrate in lower part, diffusely covered above with simple spreading hairs; leaves linear-lanceolate, 7–17 mm long and 1–2.5 mm broad, acute, glaucous beneath, covered above with soft

simple hairs; flowers in the axils of upper leaves; pedicels 2–5 mm long, covered with articulate hairs; bracts none; sepals 4, narrowly ovate, 4 mm long and ca. 1 mm broad, acute, obscurely nerved, covered in lower part with crisp hairs; petals 4, white, shorter than to about as long as calyx, the limb cleft to the middle, with linear-oblong lobes; stamens 8, of these 4 glandular at base; ovary 8–10-ovuled; capsule shorter than calyx; seeds rounded-reniform, 0.8 mm in diameter, almost smooth. July–August.

Taluses in the alpine zone, at 4,200 m. — Centr. Asia: Pam.-Al. (Shugnan, Vranich River gorge). Endemic. **Gen. distr.:** Chinese Pamir. Described from the Pistan Gorge in the Sary-bas Range. Type in Leningrad.

Section 5. OLIGOSPERMA Boiss. Fl. Or. I (1867) 705. — Sepals and petals 5; styles 2; ovary 4–6-ovuled. Perennials.

49. *S. kotschyana* Fenzl in Kotschy, Pl. Pers. austr. (1855); Boiss. Fl. Or. I (1867) 705. — Exs.: Pl. Pers. austr. (1845) no. 534.

423

Perennial; rootstock rather stout, creeping; stems 30–45 cm long, indurated, rather stout, terete, dichotomously branched, covered with very short crisp hairs, thickened at nodes; leaves sessile, lanceolate, acuminate, 1-nerved, the lower 2–3 cm long and to 7.5 mm broad; inflorescence many-flowered, loosely corymbose, the terminal flowers borne on long filiform pedicels; bracts very small, herbaceous, glabrate; sepals 2.5–3.5 mm long, oblong-lanceolate, scarious-margined, glabrate, obscurely nerved; petals 5, about as long as calyx, 2-lobed to one-third; capsule surmounted by 2 styles, equaling calyx, 4-valved to base, 2-seeded; seeds to 3 mm long, finely tuberculate. June–July.

Gravelly sites and stony slopes. — Centr. Asia: Mtn. Turkm. **Gen. distr.:** Iran. Described from Iran. Type in Geneva.

Section 6. PSEUDALSINE Boiss. Fl. Or. I (1867) 705. — Sepals and petals 4; stamens 4; styles 2; ovary 4–6-ovuled. Annuals.

50. *S. alsinoides* Boiss. et Buhse Aufz. (1860) 41; Boiss. Fl. Or. I (1867) 705.

Annual; rootstock slender, creeping; stems 8–18 cm long, slender, erect, dichotomously branched, glaucescent, glabrous; leaves sessile, narrowly linear, acuminate, prickle-tipped, glabrous, to 2 cm long; inflorescence terminal, loosely cymose; pedicels long, filiform; bracts very small, linear-lanceolate, herbaceous; sepals 4, narrowly lanceolate, long-acuminate, with prominent midrib, scarious-margined; petals 4, linear, shortly 2-lobed, slightly shorter than calyx; stamens 4; capsule oblong, slightly shorter than calyx, 4-valved to base; seeds compressed-globular, finely tuberculate. May–July.

Mountain slopes. — Centr. Asia: Mtn. Turkm., Syr D., Pam.-Al. **Gen. distr.:** Iran. Described from E. Iran (mountains in the vicinity of Yezd). Type in Geneva.

Turcz. ex Besser in Flora XVII, 1 Beibl. (1834) 9; Fenzl in Endl. Gen. (1840) 968; Turcz. Fl. baic.-dahur. I (1842) 238, non Kraschennikowia† Gildenstadt (1773) = Eurotia L. — Pseudostellaria Pax in Engl. u. Prantl Natürl. Pflanzenf. B. 16 c. (1934) 318.

424 Flowers dimorphous; chasmogamous flowers terminal or in the axils of upper leaves; calyx of 5 or rarely 4 sepals united only at base; corolla white, longer than calyx; petals 5, rarely 4, entire or notched at apex; stamens 10, more rarely 8; anthers dark violet; styles 2 or 3 (rarely 1–4), filiform; stigmas small, capitate; ovary globose or globular-ovoid, 1-locular, 8–16-ovuled; mature capsule scarious (the seeds showing through the capsule walls), dehiscing by 4 or 5 valves; seeds 2–10, rounded-reniform, somewhat flattened, covered with tubercles or anchor-shaped prickles; chasmogamous flowers rare; cleistogamous flowers in the axils of lower and sometimes median leaves, calyx of 4 pubescent sepals; petals none; stamens 2; styles 2, short, connate. Perennial tuberiform plants, the tubers globose, ovaloid or fusiform.

1. Leaves linear, linear-lanceolate, or oblong-linear, apiculate, sessile 2.
- + Leaves ovate, oblong, or lanceolate, at least some petiolate 3.
2. Leaves thin; tubers elongate-ovaloid or short-fusiform; petals deeply notched; cleistogamous flowers always present, often on abbreviated shoots, in groups of 2–4 (in the shade of mixed woods) 1. *K. silvatica* Maxim.
- + Leaves firm, rigid; tubers fusiform, to 9 cm long; petals entire; cleistogamous flowers often wanting (stony slopes). . . 2. *K. rigida* Kom.
3. Leaves ovate or oval, rounded at base, sessile, the margin and under-side of midrib ciliate 3. *K. japonica* Korsh.
- + Leaves more or less attenuate toward base; midrib not ciliate 4.
4. Stems with flagelliform and sometimes rooting extensions, these almost leafless or with minute leaves 4. *K. davidi* Franch.
- + Stems erect or ascending, without flagelliform extensions 5.
5. Stoloniferous plants; stolons underground, creeping, with tufts of fibrous roots and globose or ovaloid tubers at the nodes; seeds covered with anchor-tipped prickles 5. *K. rupestris* Turcz.
- + Tuber solitary at stem base, stoutly fusiform; seeds covered with obtusish shortly point-tipped tubercles 6. *K. maximowicziana* Fr. et Sav.

1. *K. silvatica* Maxim. Primit. Fl. Amur. (1859) 57; Korsh. in Bull. Acad. Pétersb. IX (1898) 386; Kom., Fl. Manchzh. II, 176. — *Stellaria silvatica* Rgl. in Bull. Soc. Nat. Mosc. XXXV (1862) 302. — *Pseudostellaria silvatica* Pax, l. c. (1934) 318. — Ic.: Rgl. in Bull. Soc. Nat. Mosc. XXXV, 1 (1862) tab. II, f. 12–16.

* Named for S. D. Krascheninnikova, academician and professor in St. Petersburg, explorer of Kamchatka and author of the first flora of St. Petersburg, born in Moscow in 1713, died in 1755.

** Treatment by O. A. Murav'eva.

† On formal grounds, the rightful name of this plant would be *Pseudostellaria*, as proposed by Pax. Considering, however, that the appellation adopted here has become thoroughly established in both Russian and foreign literature while the defunct homonym *Kraschennikowia* belongs among the synonyms of the earlier described genus *Eurotia* L., there seems to be no imperative need to change the firmly rooted name.

Perennial; tubers elongate-ovaloid or short-fusiform; stems erect, 12–25 cm long, pubescent in two lines; leaves 4–6 pairs, thin, 0.3–0.5 (0.7) cm broad, glabrous; chasmogamous flowers 1–8; on pubescent pedicels in the axils of upper leaves, sometimes forming dichasia; sepals 5, narrowly lanceolate, taper-pointed, glabrous or sparingly hairy at base, sometimes scarious-margined; petals lobed to one-third, sometimes twice as long as calyx; stamens 8–10; styles 2 or 3; cleistogamous flowers in the axils of lower leaves, solitary on abbreviated shoots; each of these bearing 3 or 4 flowers and very small narrow leaves; seeds brown, covered with small sharp tubercles. May–July.

Coniferous and mixed woods, in the shade, on moist soil rich in humus. — Far East: Uda, Uss., Ze.-Bu. Gen. distr.: Manchuria, Korea, China. Described from the Bureya Mountains in the Uda area. Type in Leningrad.

2. *K. rigida* Kom. in Bull. Jard. Bot. Pétersb. XVI (1916) 167; Kom. and Alis., Opred. rast. Dal'nevost. kr. 1, 494. — *Pseudostellaria rigida* Pax in Engl. u. Prantl, l. c. (1934) 318.

Perennial; tubers large, elongate-fusiform, to 9 cm long, filled with starch; underground stems creeping; aerial stems at first creeping, then erect, 10–15 cm long, indurated, dichotomously branched at the ends, densely leafy, with two rows of crisp hairs; radical leaves small, scalelike, colorless; cauline 3–5 cm long, 0.3–0.8 cm broad, lanceolate or linear-oblong, rigid, sometimes whitish beneath; flowers solitary, axillary; pedicels to 1 cm long, glabrous; sepals lanceolate to narrowly oblong, tapering toward apex, glabrous; petals entire, oblong, obtuse, one-third longer to twice as long as calyx; stamens 10, somewhat shorter than petals; styles 2, somewhat exceeding petals; only some of the flowers bearing fruit; this mostly 1-seeded; seed rather large, brown, finely tuberculate; cleistogamous flowers have not been observed. May–July. (Plate XXII, Figure 2).

Stony slopes. — Far East: Uss. Endemic. Described from the lower reaches of the Amur River. Type in Leningrad.

3. *K. japonica* Korsh. in Bull. Acad. Pétersb. IX (1898) 40, 391; Kom., Fl. Manchzh. II, 178. — *Pseudostellaria japonica* Pax in Engl. u. Prantl, l. c. (1934) 318.

426 Perennial; tubers several or one at stem base, short-fusiform, 1–2 cm long; stems ascending at base, then erect, 15–35 cm long, with one line of hairs; lowest leaves (one or two pairs) oblong to oblong-linear, tapering to a petiole, to 4 cm long and to 0.5 cm broad; other leaves oval or ovate, apiculate, rounded at base, subsessile, 3–5 cm long, 1.5–2.5 cm broad, the margin and underside of midrib hispid; chasmogamous flowers 1–3; pedicels pubescent, about as long as blade; calyx glabrous or at base and outside sparsely hairy; sepals oblong to oblong-ovate; petals notched at apex, nearly twice as long as calyx; stamens 10; styles 2 or 3; seeds ferruginous-brown, covered with small sharp tubercles; cleistogamous flowers in lightly shaded specimens infrequent, in heavily shaded ones in almost all leaf axils. May–August. (Plate XXII, Figure 3).

Shady mixed and deciduous woods, on loose soil rich in humus. — Far East: Uss. Gen. distr.: Japan, Manchuria. Described from Japan (Honshu Island). Type in Leningrad.

4. *K. davidi* Franch. Pl. David. I (1884) 51; Korsh. Bull. Acad. Pétersb. IX (1898) 390; Kom., Fl. Manchzh. II, 177. — Ic.: Franch., l. c., Nov. Arch. du Mus., 2 ser., t. V, pl. 10 (var. *flagellaris* Franch.).



PLATE XXII. 1. *Krascheninnikowia silvatica* Maxim., petal, seed.— 2. *K. rigida* Kom., petal, seed.— 3. *K. japonica* Korsch., seed.— 4. *K. maximowicziana* Franch. et Sav., seed and its detail.— 5. *K. davidii* Franch.— 6. *K. rupestris* Turcz., seed and its detail.— 7. *Malachium aquaticum* (L.) Fries., seed, petal, style.— 8. *Cerastium cerastoides* (L.) Britt., petal.— 9. *C. anomalum* W. et K., capsule, petal, seed.— 10. *C. falcatum* Bge., capsule, petal, seed.— 11. *C. maximum* L., petal, capsule.

Perennial; tuber solitary at stem base, short-fusiform, ca. 1 cm long; stems slender, 8–26 cm long, ascending or decumbent, simple or dichotomously branched, with slender flagellate extensions, these leafless or minutely leafy, sometimes rooting; lowest leaves (one or two pairs) oblong or spatulate, gradually tapering to petiole, 1.5–2 cm long, 0.3–0.4 cm broad; median leaves larger, to 2.5 cm long and ca. 1 cm broad, lance-oval or ovate, acute, subtruncate or rounded at base, the very short petiole sometimes ciliate; chasmogamous flowers axillary, on pubescent petioles, overtopping leaves; sepals pubescent outside, lanceolate to linear-lanceolate, sometimes scarious-margined; petals entire, somewhat longer than calyx; stamens 10; styles 2 or 3; seeds covered with elongated point-tipped tubercles; cleistogamous flowers as in the other species. May–August. (Plate XXII, Figure 5).

Mixed woods, on soil rich in humus, banks of forest streams and rivulets, in the shade. — Far East: Uss. (Mongugai Valley). **Gen. distr.:** Mong., Manchuria. Described from E. Mongolia (Jehol). Type in Paris.

Note. An error undoubtedly crept into Franchet's description, as 5 stamens are indicated for *K. davidi*, even though in all the species of this genus chasmogamous flowers have as a rule 10 or more rarely 8 stamens, but never 5.

429. 5. *K. rupestris* Turcz. Fl. baic.-dahur. 1 (1842) 238; Ldb. Fl. Ross. I (1842) 373; Kom., Fl. Manchzh. II, 179. — *K. borodini* Kryl. in Mém. Bot. offerts à Mr. I. Borodine (1927) 220; Kryl., Fl. Zap. Sib. V, 985. — *Pseudostellaria rupestris* Pax et *P. borodini* Pax in Engl. u. Prantl, l. c. (1934) 318. — Ic.: Rgl. in Bull. Soc. Nat. Mosc. XXXV, 1 (1862) t. II, f. 7–11; Kryl. in Mém. Bot., l. c.

Perennial; underground stolons bearing at nodes tufts of fibrous hairs and small globose, ovaloid, or short-fusiform tubers ca. 1 cm long; stems weak, simple, rarely branched, 7–20 cm long, glabrous or with short hairs in a single line; leaves lanceolate, linear-lanceolate, or narrowly oblong, tapering to petiole, 1.5–4 cm long, 0.3–0.8 cm broad, glabrous or the margin ciliate; chasmogamous flowers terminal or axillary; pedicels glabrous or pubescent; sepals oblong-lanceolate, narrowly scarious-margined, glabrous, more rarely sparingly hairy; petals entire, rarely retuse, about one-third longer than sepals; stamens 10, about as long as petals; styles 3, rarely 2; cleistogamous flowers in forms exposed to light (lower, with erect stem) absent, in shade-grown forms (with long, more slender, weak stems) in leaf axils all over the plant; fruit set by flowers of both types; seeds aculeate, the bristles anchor-shaped at tips. June–August. (Plate XXII, Figure 6).

Stony slopes and rock crevices. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Ze.-Bu., Uda (S.). **Gen. distr.:** Manchuria, Mong. Described from Transbaikalia. Type in Kharkov.

6. *K. maximowicziana* Franch. et Sav. Enumer. Pl. Japon. II (1876–79) 297; Korsh. in Bull. Acad. Pétersb. IX (1893) 39 et 389; Kom., Fl. Manchzh. II, 179. — *Pseudostellaria maximowicziana* Pax in Engl. u. Prantl, l. c. (1934) 318.

Perennial; tuber solitary, stoutly fusiform, 1–1.5 cm long; stems simple, sometimes sparsely branched, 5–10 cm long, with 1 or 2 lines of short hairs; leaves sessile or short-petioled, the lower and median lanceolate or oblong, the upper suboval to lanceolate, acute or subobtuse, to 2 cm long, 0.4–0.6 cm broad; chasmogamous flowers on rather long

pedicels with a single line of hairs; sepals lanceolate, pubescent, scarious-margined, sometimes ciliate; petals entire, rarely slightly notched; stamens 10, slightly shorter than or as long as petals; styles 2, more rarely 3; seeds finely tuberculate, the obtusish tubercles point-tipped at center; cleistogamous flowers rarely developed in specimens exposed to light. May–July. (Plate XXII, Figure 4).

Placers in wooded areas. — Far East: Uss. Gen. distr.: Manchuria, Japan, China. Described from Japan (Fujiyama). Type in Paris.

430

Genus 463. **MALACHIUM*** FRIES **

Fries Fl. Hall. (1817) 77.; *Myosoton* Moench. Meth. (1794) 225.

Sepals 5; petals 5, deeply cleft; stamens 10; styles 5; capsule ovoid or oblong-ovoid, dehiscing by 5 bifid valves.

M. aquaticum — in Postpliocene formations of V.-Don (Aleksin).

1. *M. aquaticum* Fries Fl. Hall. (1817) 78; Ldb. Fl. Ross. I, 416; Shmal'g., Fl. I, 158; Kryl., Fl. Zap. Sib. V, 1004. — *Cerastium aquaticum* L. Sp. pl. (1753) 439. — *Stellaria aquatica* Scop. Fl. Carn. II, 1 (1774), 319. — *Myosoton aquaticum* Moench, Meth. (1794) 225; Grossg., Fl. Kavk. II, 379.

Perennial, glandular in upper part, glabrous below; stem ascending, simple or more often branched at summit, 20–70 cm long; leaves ovate to oblong-ovate, 3–8 cm long and 1–4 cm broad, acute, sometimes cordate at base, the upper sessile, the lower short-petioled; inflorescence a loose cyme; bracts green, leaflike; pedicels 1–2.5 cm long, recurved after flowering; sepals ovate, herbaceous, 4–6 mm long; petals white, 1.5–2 times as long as calyx, 2-parted nearly to base; capsule slightly exceeding calyx; seeds dark brown, rounded-reniform, flat, muricate. June–September. (Plate XXII, Figure 7).

Canal and riverbanks, sometimes damp meadows, occasionally near houses. — European part: all regions; Caucasus: all regions; W. Siberia: all regions; E. Siberia: Yeniss., Ang.-Say.; Far East: Kamch. (recorded by Hulten between Petropavlovsk and Elizovo (introduced?)); Centr. Asia: Ar.-Casp., Balkh., T. Sh. Gen. distr.: Scand., Centr. Eur., Jap.-Ch. Described from the Netherlands. Type in London.

Genus 464. **CERASTIUM**† L.

L. Sp. pl. (1753) 437.

Sepals 5; petals 5, white, mostly 2-cleft to one-third or to the middle, more rarely merely notched at apex or entire, very rarely coarsely and unevenly toothed; stamens 10, rarely 5; style 5 or 3 (subgenus *Dichodon*); capsule oblong-cylindric, often curved below summit, dehiscing by 10 or rarely 6 teeth. Annuals or perennials, mostly hairy, rarely glabrous. Russian: yasolka.

* From Greek *malacos*, soft.

** Treatment by O. A. Murav'eva.

† From Greek *ceras*, horn, alluding to the shape of capsule in some species.

1. Styles 3; capsule dehiscing by 6 teeth 2.
 + Styles 5; capsule dehiscing by 10 teeth 3.
 2. Annual plants with erect stems; petals very slightly exceeding calyx;
 capsule with erect flat teeth 2. *C. anomalum* W. et K.
 + Perennial with prostrate rooting stems; petals 1.5 — 2.5 times as
 long as calyx; capsule teeth reflexed . . . 1. *C. cerastoides* (L.) Britt.
 3. Annuals with slender roots 4.
 + Perennials 20.
 4. Glaucous plants, completely glabrous or with very sparse spreading
 hairs in lower part 5.
 + Plants clothed with simple or glandular hairs 7.
 5. Petals none; capsule curved, with erect revolute-margined teeth;
 leaves small 27. *C. alexeenkoanum* Schischk.
 + Petals shorter than calyx; capsule straight, with circinate-revolute
 teeth; leaves in pairs connate at base 6.
 6. Filaments glabrous; seeds acutely tuberculate, ca. 1.5 mm long.
 17. *C. perfoliatum* L.
 + Filaments ciliate; seeds obtusely tuberculate, 0.5 mm long
 18. *C. chlorifolium* Fisch. et Mey.
 7. Capsule teeth reflexed; lower leaves long-petioled 8.
 + Capsule teeth erect, involute-margined or flat 11.
 8. Plants mostly 25 — 60 cm high; petals equaling or shorter than
 calyx 9.
 + Plants 10 — 25 cm high; petals slightly exceeding to 1.5 times as long
 as calyx 10.
 9. Petioles of lower leaves as long as or longer than blade; stems
 pubescent on one side in upper part; pedicels 1-sidedly pubescent;
 sepals pubescent only at the very base, glabrous above; petals
 1.5 — 2 times as long as calyx, their blade notched to one-sixth or
 one-fifth 12. *C. holosteam* Fisch.
 + Lower leaves short-petioled or sessile; stems in upper part and
 pedicels pubescent on all sides; sepals pubescent all over the back;
 petals equaling or but slightly exceeding calyx, the blade lobed to
 one-third 13. *C. nemorale* M. B.
 10. Petals 2-cleft to about the middle, slightly exceeding calyx; filaments
 of 5 stamens hairy at base; pedicels many times as long as calyx;
 seeds small, ca. 0.5 mm long 10. *C. microspermum* C. A. M.
 + Petals notched or scarcely lobed, 1.5 times as long as calyx; filaments
 of all stamens hairy; pedicels 2 — 3 times as long as calyx; seeds to
 1 mm in diameter 11. *C. armeniacum* Gren.
 11. Capsule straight, narrowly cylindric-conical, 3 times as long as calyx,
 its teeth flat 12.
 + Capsule curved, 1.5 — 2.5 times as long as calyx, rarely straight and
 then but slightly exceeding calyx, its teeth revolute-margined 13.
 12. Calyx 8 — 10 mm long, not inflated in fruit 19. *C. dichotomum* L.
 + Calyx 12 — 13 mm long, inflated in fruit 20. *C. inflatum* Link.
 13. Sepals glabrous at apex 14.
 + Sepals hairy at apex 19.
 14. Sepals 6 — 13 mm long; claws of petals and filaments of stamens
 ciliate 15.

- 433 + Sepals 3.5—4.5 mm long; claws of petals and filaments glabrous 16.
15. Leaves 3—5 mm broad; petals cleft to the middle; capsule straight; seeds bluntly tuberculate, 0.75 mm long 21. *C. longifolium* Willd.
- + Leaves 4—15 mm broad; petals lobed to one-fourth; capsule curved; seeds sharply tuberculate, 1 mm long 22. *C. ruderale* M. B.
16. Bracts and sepals scarious to the middle; stamens 5 17.
- + Bracts and sepals narrowly scarious only at the very apex and at margin 19.
17. Petals equaling or but scarcely longer or shorter than calyx, obovate, lobed to one-fourth 25. *C. semidecandrum* L.
- + Petals half to one-third as long as calyx, often linear, frequently toothed at apex 26. *C. dentatum* Möschl.
18. Stem divaricately profusely branched from the base or about the middle; petals and sepals reddish-margined; sepals prominently 3—5-nerved; capsule mostly suffused with violet 29. *C. schmalhauseni* Pacz.
- + Stem sparsely branched; branches erect; petals white; sepals not colored, obscurely nerved 28. *C. glutinosum* Fr.
19. Leaves oval, sometimes suborbicular; petals in dense cymes; pedicels shorter than calyx 24. *C. glomeratum* Thuill.
- + Leaves oblong or elliptic; pedicels after anthesis 2—3 times as long as calyx 23. *C. tauricum* Spreng.
20. Sepals quite glabrous, lustrous 21.
- + Sepals more or less pubescent 24.
21. All leaves petioled or tapering toward base; capsule teeth erect, revolute-margined 30. *C. meyerianum* Rupr.
- + Cauline leaves amplexicaul; capsule teeth spreading or reflexed 22.
22. Plants to 30 cm high; stems trailing on the ground; roots fusiformly thickened 16. *C. oreades* Schischk.
- + Stems 30—100 cm long; roots moniliform; plants covered at least in lower part with spreading hairs 23.
23. Rather large, readily deciduous proliferous buds present in the axils of cauline leaves, hence lower leaves reflexed 15. *C. hemschnicum* Schischk.
- + Proliferous buds wanting; all leaves horizontally spreading or obliquely ascending 14. *C. dahuricum* Fisch.
24. Petals shorter than or more rarely equaling calyx 33. *C. caespitosum* Gilib.
- + Petals slightly longer or 1.5—2.5 times as long as calyx 25.
25. Reduced shoots [fascicles] with narrower leaves present in the axils of all cauline leaves 43. *C. arvense* L.
- + Reduced axillary shoots usually absent 26.
26. Plants white-tomentose or floccose with crisp hairs (Caucasus, Crimea) 27.
- + Plants profusely hairy but neither floccose nor crisp-hairy 32.
27. Cauline leaves elliptic, 5—10 mm broad (W. Transc.) 49. *C. ponticum* Alb.
- + Cauline leaves ovate-lanceolate, 3—5 mm broad 28.
28. Plants rather densely matted; stems 15—30 cm high 29.
- + Plants 5—15 cm high, mostly not matted 31.

29. Leaves linear, flat; plant densely white-tomentose throughout; petals shallowly notched (Crimea) 44. *C. biebersteinii* DC.
 + Leaves revolute-margined, the lower and those of sterile shoots often recurved; if leaves almost flat then indument crisp-floccose; petals lobed to one-third (Transc.) 30.
30. White tomentose densely matted plants; leaves nearly always with revolute margins; plants of submontane rocks 43. *C. argenteum* M. B.
 + Floccose or sometimes almost glabrous plants, often with flat leaves; mountain plants 46. *C. sosnowskyi* Schischk.
31. Leaves linear or lanceolate (E. and S. Transc.) . . . 47. *C. szowitsii* Boiss.
 + Leaves ovate-lanceolate (Dagestan) . . . 48. *C. daghestanicum* Schischk.
32. Petals entire or very slightly notched or toothed 33.
 + Petals lobed to one-fourth or one-third their length 36.
33. Flowers relatively small; petals 9–12 mm long; plants 10–60 cm high 34.
 + Flowers large; petals 14–18 mm long; stems 5–15 cm high. Plants of the high-alpine zone 35.
34. Stems solitary, 30–60 cm long, covered in upper part with glandular hairs; sepals 4–5 mm long, obtuse, glandular-hairy all over the back; petals 3 times as long as calyx 3. *C. pauciflorum* Stev.
 + Stems several, 10–30 cm long, covered with simple hairs; sepals 6–9 mm long, acute, mostly hairy only in lower part; petals 1.5–2 times as long as calyx 4. *C. falcatum* Bge.
35. Sepals ovate, 4–6 mm broad, obtusish 6. *C. undulatifolium* Som. et Lev.
 + Sepals lance-ovate, ca. 3 mm broad, acuminate 7. *C. lithospermifolium* Fisch.
36. Capsule teeth circinate-revolute 37.
 + Capsule teeth straight, with revolute margins 39.
37. Stems 20–40 cm long; leaves 4–8 cm long 5. *C. maximum* L.
 + Stems 3–20 cm long; leaves 0.5–3 cm long 38.
38. Leaves, except the upper ones, spatulate or oval, 5–6 mm long, tapering to petiole; seeds smooth 8. *C. kasbek* Parrot.
 + All cauline leaves sessile, 1–3 cm long; seeds bluntly tuberculate 9. *C. multiflorum* C. A. M.
39. Petals in lower part and filaments densely hairy, rarely filaments glabrous 40.
 + Petals and filaments glabrous 41.
40. Sepals obtusish, ca. 5 mm long; petals lobed to one-third, to 10 mm long 32. *C. furcatum* Cham. et Schlecht.
 + Sepals acute, 5–12 mm long; petals notched, 10–20 mm long 31. *C. purpurascens* Adams.
41. Petals only slightly longer than calyx 42.
 + Petals 1.5–3 times as long as calyx 44.
42. Plants forming a dense mat, covered throughout with long spreading hairs. Arc. Sib., Chuk. 41. *C. bialynickii* Tolm.
 + Plants forming a loose tuft of few stems. Urals and mountains of Central Asia 43.

43. Stems 16—40 cm long; leaves lanceolate, 2—4 cm long; Central Asia 34. *C. tianschanicum* Schischk.
 + Stems 5—16 cm long; leaves elliptic, 0.6—2 cm long. Urals 36. *C. gorodkovianum* Schischk.
44. Leaves elliptic or obovate, 3—10 (15) mm long and 3—7 mm broad, becoming leathery, glabrous, lustrous; plants commonly matted . . . 45.
 + Leaves oblong-ovate or lanceolate, 1—3 mm long and 3—12 mm broad; loosely cespitose plants 46.
45. Stems and leaves densely hairy, tardily glabrescent, lustrous; leaves 7—15 mm long and 3—7 mm broad; calyx 5.5—9 mm long 39. *C. alpinum* L.
 + Stems and leaves glabrate; leaves broad-ovate, sometimes sub-orbicular, 3—6 mm long and 3 mm broad; calyx 4 mm long 40. *C. regelii* Ostenf.
46. Flowers numerous on the stem, in a dense cyme; leaves large, 2—5 cm long 37. *C. fischerianum* Ser.
 + Flowers on the stem 3—8, in a loose cyme, rarely solitary 47.
47. Sepals lanceolate, 5—8 mm long; plants puberulent or glabrate throughout (Caucasus) 42. *C. polymorphum* Rupr.
 + Sepals elliptic, 4—6 mm long; plants densely pubescent 48.
48. Leaves oblong, 2.5—4 mm broad; sepals 4—5 mm long; stems 15—30 cm long. (Boreal-arctic region) 35. *C. beeringianum* Cham. et Schlecht.
 + Leaves elliptic-oblong, 3—9 mm broad; sepals 5—6 mm long, often colored; stems 5—15 cm long (mountain plant) . . . 38. *C. pusillum* Ser.

Subgenus 1. **DICHODON** (Bartl.) Fenzl in Ldb. Fl. Ross. I (1842) 496; Williams in Journ. of Bot. XXXVI (1898) 10. — Gen. *Dichodon* Bartl. in Rchb. Nomencl. (1841) 205. Petals deeply notched; styles 3 (rarely 4 or 5); capsule dehiscent by 6 teeth.

1. *C. cerastoides* Britt. Mém. Torr. Bot. Club V (1894) 150. — *Stellaria cerastoides* L. Sp. pl. (1753) 422; Turcz. Fl. baic.-dahur. I, 226. — *Cerastium trigynum* Vill. Hist. pl. Dauph. III (1789) 645; Fenzl in Ldb. Fl. Ross. I, 396; Boiss. Fl. Or. I, 715; Rupr. Fl. Cauc. 223, 297; Fom. and Voron., Opred. rast. Kavk. II, 2, 160; Kryl., Fl. Zap. Sib. V, 1006. — *Cerastium elegans et rupestre* Fisch. ex Ser. in DC. Prodr. I (1824) 417. — *C. obtusifolium* Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV, 3 (1841) 393; Fenzl in Ldb. Fl. Ross. I, 398. — Ic.: Vill., l. c., tab. 46. — Russian name: yaskolka trekhstolbikovaya [tristylous].

436

Perennial; stems prostrate, rooting and branched at base, then ascending to erect, 5—20 cm long, commonly glabrous in lower part, glandular-hairy above, often more profusely on one side of internodes; leaves oblong, lanceolate, or linear, 1—2 cm long, 1—2.5 (4) mm broad, obtusish, glabrous (var. *elegans* (Fisch.) Schischk.) or the upper glandular-pubescent; sterile shoots often arising from the axils of lower leaves; flowers in a dichasial terminal inflorescence; pedicels glandular-pubescent, to 2.5 cm long, recurving after flowering; sepals oblong, obtuse, 4—5.5 mm long, glandular-pubescent on the back; petals white, 1.5—2.5 times as long as calyx, lobed to one-fourth or one-third their length; styles 3, very rarely 4; capsule oblong, 1.5—2 times as long as calyx, dehiscent by 6 reflexed teeth; seeds small, ca. 0.5 mm long. May—August. (Plate XXII, Figure 8).



PLATE XXIII. 1. *Cerastium undulatifolium* Som. et Lev., capsule.— 2. *C. microspermum* C. A. M.— 3. *C. nemorale* M. B.— 4. *C. holosteam* Fisch.— 5. *C. perfoliatum* L.— 6. *C. inflatum* Link.

Alpine and subalpine meadows and moss-and-lichen tundra in the Arctic region. — Arctic: Arc. Eur., Nov. Z., Arc. Sib.; European part: N. Urals; Caucasus: Greater Caucasus, Dag., W., E., and S. Transc., Tal. (?); W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** Scand., Centr. and Atl. Eur., Med., Bal.-As. Min., Iran., Dzu.-Kash., Ind.-Him., Mong., Greenland, N. Am. Described from the mountains of Lapland. Type in London.

2. **C. anomalum** Waldst. et Kit. in Willd. Spec. pl. II (1798) 812; Fenzl in Ldb. Fl. Ross. I, 397; Boiss. Fl. Or. I, 714; Shmal'g., Fl. I, 160; Voron., Opred. rast. Kavk. II, 2, 157. — *Stellaria viscida* M. B. Fl. taur.-cauc. I (1808) 342. — *S. sabulosa* Fisch. ex Ser. in DC. Prodr. I (1824) 397. — *S. anomala* Rchb. Fl. Germ. excurs. (1830–32) 785. — *Holosteum dichotomum* C. Koch in Linnaea XV (1841) 708. — *H. polygamum* C. Koch, l. c. (1841). — *Dichodon anomalum* Rchb. Ic. Fl. Germ. V (1842) t. 221. — Ic.: Rchb. Ic. Fl. Germ., t. 221; Waldst. et Kit. Pl. rar. hung., t. 22.

Annual; stem erect or ascending, simple or branched, almost glabrous in lower part, glandular-hairy above, 5–30 cm long; leaves linear, sessile or the lower spatulate, tapering to a short petiole, obtuse, glandular-hairy on the margin, commonly glabrous elsewhere; pedicels as long as or longer than calyx, glandular-pubescent; sepals lanceolate, obtusish or acute, narrowly scarious-margined, 3–5 mm long, 1–1.5 mm broad, more or less glandular-pubescent on the back, 3-nerved; petals slightly exceeding 1.5 times as long as calyx, lobed to between one-fifth and one-half their length; capsule oblong-cylindric, 1.5–2 times as long as calyx, dehiscent by 6 flat teeth; seeds small, 0.5 mm long. April–May. (Plate XXII, Figure 9).

439 Moist sandy and solonchak sites. — European part: U. V. (Penza), Transv., L. V., Bl., Crim.; Caucasus: Cisc., Dag., E., S., and W. Transc. (Sochi), Tal. **Gen. distr.:** Centr. Eur., W. and E. Transc., Bal.-As. Min., Arm.-Kurd., Iran. Described from Hungary. Type in Berlin.

Subgenus 2. **EUCERASTIUM** (Boiss.) Pax in Engl. u. Prantl, Nat. Pflanzenf. II, 1 (1884) 80. — Section *Eucerastium* Boiss. Fl. Or. I (1867) 713. — Styles 5; capsule dehiscent by 10 teeth.

Section 1. **STREPHODON** Ser. in DC. Prodr. I (1824) 414. — Capsule teeth circinate-revolute.

Series 1. **Leiopetala** Fenzl. in Ldb. Fl. Ross. I (1842) 398. — Perennials with pubescent calyx and leaves tapering toward base; claws of petals and stamens glabrous.

3. **C. pauciflorum** Stév. ex Sér. in DC. Prodr. I (1824) 414. — *C. ledebourianum* Ser. in DC. Prodr. I (1824) 420; Kryl., Fl. Zap. Sib. V, 1007. — *C. pilosum* Ldb. in Mém. Ac. Pétersb. V (1815) 539, non Sibth. et Sm. (1806–9); Fenzl in Ldb. Fl. Ross. I, 398; Turcz. Fl. baic.-dahur, I, 240;

Kom., Fl. Manch. II, 181. — Ic.: Ldb. Ic. pl. Fl. Ross. IV, tab. 351; Fl. Yugo-Vost. IV, fig. 300. — Exs.: HFR no. 1561.

Perennial; stem erect, 20–60 cm long, branched only in the inflorescence, covered with spreading hairs, glandular-puberulous at summit; leaves ovate-lanceolate, 3–6 cm long and 1–2 cm broad, acute, tapering toward base, sessile; flowers 3–7 in a terminal cyme; pedicels 8–50 mm long; bracts very small, herbaceous; sepals ovate, 4–5 mm long and ca. 2 mm broad, glandular-puberulous; petals 2.5–3 times as long as calyx, entire or notched or crenate; capsule 2–3 times as long as calyx, with circinate-revolute teeth. June–July.

Coniferous and mixed woods, wood margins, and scrub. — European part: V.-Kama (Sterlimatak Kanton — Bol'shoi Kudash, Mesyagutovskii Kanton — village of Leuza), Urals; W. Siberia: Ob (E. part), Alt.; E. Siberia: Ang.-Say., Yenisi., Dau.; Far East: Ze.-Bu., Uss.; Centr. Asia: Dzu.-Tarb. (Tarbagatai). **Gen. distr.:** N. Mong., Manchuria, N. Korea. Described from Siberia. Type in Geneva.

440 4. *C. falcatum* Bge. in Mém. prés. à l'Ac. Sc. Pétersb. II, 6 (1835) 37, nomen nud., excl. syn. *Stellaria falcata* Ser.; Fenzl in Ldb. Fl. Ross. I (1842) 298, descr.; Kryl., Fl. Zap. Sib. V, 1009. — *C. lithospermifolium* Bge. in Ldb. Fl. Alt. II, 179, non Fisch. — *C. maximum* β *falcatum* Gren. Monogr. Cerast. (1841) 15; Rgl. in Bull. Soc. Nat. Mosc. XXXV, 1 (1862) 311. — Ic.: Ldb. Ic. pl. Fl. Ross. V, tab. 443 (sub *C. lithospermifolio*).

Perennial; stems 7–30 cm long, simple or branched, covered in lower part with short appressed hairs, and with short spreading hairs at summit; leaves lanceolate to linear-lanceolate, 2–9 cm long and 2–8 mm broad, glabrous or puberulous, the margin scabrous-ciliate; inflorescence a 3–7-flowered terminal cyme or rarely flowers solitary; pedicels shorter than to 2–3 times as long as calyx, recurving after anthesis, puberulous; sepals lance-ovate to lanceolate, 6–9 mm long and 2–3 mm broad, acute, with prominent midrib and obscure lateral veins, scarious-margined, puberulous on the back, often only in lower part; petals 1.5–2 times as long as calyx, entire or scarcely notched; capsule oblong-ovoid, 1.5 times as long as calyx, with circinate-revolute teeth; seeds finely tuberculate, 0.75 mm long. May–June. (Plate XXII, Figure 10).

Scrub, open woods, gravelly slopes, and solonetzic meadows. — W. Siberia: Alt.; Centr. Asia: Balkh., Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** Dzu.-Kash. Described from Altai. Type in Leningrad.

5. *C. maximum* L. Sp. pl. (1753) 439; Gren. Monogr. Cerast., p. 15; Fenzl in Ldb. Fl. Ross. I, 399, pro maxima parte; Turcz. Fl. baic.-dahur. I, 241; Kryl., Fl. Zap. Sib. V, 1008; Kom., Fl. Kamch. II, 91. — *C. maximum* α *typicum* Rgl. in Bull. Soc. Nat. Mosc. XXXV, 1 (1862) 309. — *C. revolutum* Meinsh. in Beiträge zur Kenntniss des Russ. Reiches XXVI (1871) 147. — Ic.: Ldb. Ic. pl. Fl. Ross. V, tab. 424. — Exs.: HFR no. 1915.

Perennial; stems erect, simple, 20–40 cm long, puberulous like the leaves and at summit glandular; leaves elliptic-lanceolate to lance-linear, acuminate, 4–8 cm long and 5–15 mm broad, the margins sometimes revolute (var. *revolutum* (Meinsh.) Schischk.); flowers 3–12 in a terminal corymbose inflorescence; bracts herbaceous, glandular; pedicels glandular-pubescent; sepals oblong-ovate to ovate, commonly glandular-pubescent, 6–10 mm long and 3–4 mm broad, obtuse or obtusish, the

margin white scarious; petals lobed to one-fourth their length, tapering to a short claw, 1.5—2 times as long as calyx, the teeth circinate-revolute; seeds ca. 2 mm in diameter. June—July. (Plate XXII, Figure 11).

Inundated and waterside meadows, scrub, and abandoned fields. — Arctic: Arc. Eur. (Yugorskii Shar), Arc. Sib., Chuk., An.; W. Siberia: Ob; E. Siberia: Yenisei, Ang.-Say., Lena-Kol.; Far East: Kamch., Okh. **Gen. distr.:** Arctic America. Described from Siberia. Type in London.

- 441 6. *C. undulatifolium* Som. et Lev. in A. H. P. XIII (1893) 41 et XVI (1900) 89; Voron. in Fom. and Voron., *Opred. rast. Kavk. II*, 2, 161; Grossg., *Fl. Kavk. II*, 381.

Perennial; stems ascending or trailing, covered with crisp hairs, 5—10 cm long; leaves broad-ovate, 1—3 cm long and 0.5—1.5 cm broad, obtuse to subacute, undulate-margined, more or less puberulous; flowers 1—3 on the stem; pedicels 2—5 times as long as calyx, recurving after anthesis; sepals ovate, obtusish, 7—8 mm long and 4—6 mm broad, scarious-margined, puberulous on the back; petals 2—3 times as long as calyx, scarcely notched; claws of petals and filaments glabrous; capsule 2—3 times as long as calyx, with circinate-revolute teeth; seeds ca. 2 mm long, striate. July—August. (Plate XXIII, Figure 1).

Taluses and glacial moraines at altitudes of 2,100—3,500 m. — Caucasus: central part of the Greater Caucasus. Endemic. Described from Mt. El'brus. Type in Leningrad.

7. *C. lithospermifolium* Fisch. in Mém. Soc. Nat. Mosc. III (1812) 81; Fenzl in Ldb. *Fl. Ross. I*, 399; Turcz. *Fl. baic.-dahur. I*, 240; Kryl., *Fl. Zap. Sib. V*, 1010. — *C. pauciflorum* Bge. in Ldb. *Fl. Alt. II* (1830) 176, non Stev.; Gren. *Monogr. Cerast.*, p. 19. — Ic.: Ldb. *Ic. pl. Fl. Ross. V*, t. 407.

Perennial, puberulous throughout, partly glandular; stems ascending at base, then erect, 7—15 cm long; leaves elliptic-lanceolate, acute, 1—2.5 cm long and 0.5—1 cm broad; flowers 2—3, terminal; pedicels 1—3 cm long, subhorizontally spreading after anthesis; sepals oblong-elliptic or ovate-lanceolate, acuminate, scarious-margined, 7—8 mm long and ca. 3 mm broad; petals slightly notched or entire, twice as long as calyx; capsule cylindric, 2—2.5 times as long as calyx, with circinate-revolute teeth. July—September.

Taluses in the alpine zone. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** N. Mong. Described from Siberia. Type in Leningrad.

Series 2. *Ciliatopetala* Fenzl in Ldb. *Fl. Ross. I* (1842) 399. — Claws of petals ciliate-bearded; filaments of stamens pubescent, rarely glabrous.

8. *C. kasbek* Parrot, *Reise Cauc. II* (1815) 88; C. A. M. *Verzeichn. Pfl. Cauc.* (1831) 223; Fenzl in Ldb. *Fl. Ross. I*, 399; Boiss. *Fl. Or. I*, 717; Rupr. *Fl. Cauc.* 224; Voron. in Fom. and Voron., *Opred. rast. Kavk. II*, 2, 160. — *C. arvense* M. B. *Fl. taur.-cauc. III*, 320, non L. — *C. chewsuricum* Som. et Lev. in *Bull. d. Soc. bot. Ital.* (1898) 129. — Ic.: Parrot, l. c., tab. 3.

Perennial, caespitose, with short radical sterile shoots; flowering stems 2.5—10 cm long, puberulous; leaves oval, 5—6 mm long and 2—3 mm broad,

442 obtuse, the lower tapering to a long petiole, the upper linear-cuneate, sessile, puberulous; flowers 3–5, terminal; pedicels filiform, equaling to twice as long as calyx, recurving after anthesis; sepals lanceolate, obtuse, 5–9 mm long and 2–3 mm broad, pubescent; petals 1.5–2 times as long as calyx, obovate-oblong, lobed to one-third, the claw ciliate; filaments glabrous; capsule straight, slightly exceeding calyx; seeds flattened, angular, 0.7–1 mm long, smooth or with small tubercles discernible at high magnification. July–August.

Taluses and rocks in the alpine zone at altitudes of 2,200–3,800 m. — Caucasus: central and E. part of the Greater Caucasus (reported, probably erroneously, for Ararat). Endemic. Described from Mt. Kazbek. Type in Leningrad.

9. *C. multiflorum* C. A. M. Verzeichn. Pfl. Cauc. (1831) 222; Gren. Monogr. Cerast., p. 16; Fenzl in Ldb. Fl. Ross. I, 401; Boiss. Fl. Or. I, 718; Rupr. Fl. Cauc. 227, 297; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 161. — *C. multiflorum*: 1) *salatavica* Rupr. et 2) *pyrrhosperma* Rupr., l. c. (1869) 227. — *C. salatavicum* Rupr., l. c., 229. — Ic.: Gren., l. c., tab. 2. — Exs.: HFR no. 1059.

Perennial, puberulous throughout, in upper part sometimes glandular; stems numerous, ascending, 8–20 cm long, branched at summit; radical leaves elliptic, tapering to a petiole; cauline leaves lanceolate to ovate-lanceolate, sessile, 1–3 cm long and 3–10 mm broad, acute or acuminate; flowers in clusters of 3–7; pedicels equaling or 2–3 times as long as calyx, recurving after anthesis; sepals lanceolate, 7–9 mm long and 2–3.5 mm broad, acute or acuminate, narrowly scarious-margined, crisp-hairy on the back; petals obovate, slightly notched or lobed to one-half their length; claws of petals in lower part of filaments long-ciliate; capsule straight, twice as long as calyx, with circinate-revolute teeth; seeds to 1.5 mm long, bluntly tuberculate on the back. May–July.

Rocks, often calcareous, and stony slopes in the alpine and subalpine zones, at altitudes of 1,200–3,000 m. — Caucasus: Dag., central and E. part). Endemic. Described from the Terek River gorge (villages of Kobi and Sion). Type in Leningrad.

10. *C. microspermum* C. A. M. Verzeichn. Pfl. Cauc. (1831) 222; Gren. Monogr. Cerast., 16; Fenzl in Ldb. Fl. Ross. I, 400; Boiss. Fl. Or. I, 718; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 164.

443 Annual, covered with short crisp hairs and somewhat viscid; stems 10–25 cm long, ascending or erect, dichotomously branching from base; lower leaves oblong-spatulate, acute to subobtuse, the median cauline lanceolate, 2–2.5 cm long and 4–8 mm broad; inflorescence terminal, cymose; pedicels 2–4 times as long as calyx, finally recurved; sepals lanceolate, 7–8 (10) mm long and 2 mm broad, acutish, scarious at margins and at tips; petals slightly longer than calyx, 2-cleft to the middle; filaments facing petals ciliate, the others glabrous; capsule almost straight, 1.5 times as long as calyx, with circinate-revolute teeth; seeds finely muricate, small, ca. 0.5 mm long. May–June. (Plate XXIII, Figure 2).

Dry slopes, open woods, and scrub. — Caucasus: Tal. Gen. distr.: N. Iran. Described from near the village of Perimbal'. Type in Leningrad.

*11. *C. armeniacum* Gren. Monogr. Cerastium (1841) 19; Fenzl in Ldb. Fl. Ross. I, 400; Boiss. Fl. Or. I, 719; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 163. — Ic.: Gren., op. cit., tab. 1.

Annual, covered throughout with simple and glandular hairs; stems 5–25 cm long, divaricately branched from base; radical leaves ovate to oblong, obtuse, the petiole as long as or longer than blade; cauline oblong-lanceolate, 1–3 cm long and 3–10 mm broad, sessile, subacute; bracts very small, herbaceous, narrowly scarious-margined; pedicels about equaling to twice as long as calyx; sepals ovate-oblong, 7–10 mm long and 2–2.5 mm broad, acute or acuminate, glandular-pubescent, broadly scarious-margined; petals 1.5 times as long as calyx, deeply notched or cleft, pubescent at base; filaments hairy; capsule 1.5 times as long as calyx, curved; seeds ca. 1 mm long, brownish. May–June.

Stony slopes and taluses, wood margins and banks of streams. — Not encountered in the USSR, but occurring in adjoining parts of Turkey in the former Ol'ty and Artvin districts. Gen. distr.: Arm.-Kurd. Armenia. Described from Armenia. Type in Paris.

12. *C. holosteuum* Fisch. ex Hornem. Hort. Hafn. (1813) 434. — *C. caucasicum* Fisch. ex Ser. in DC. Prodr. I (1824) 414; Grossg., Fl. Kavk. II, 385. — *C. elongatum* M. B. Fl. taur.-cauc. III (1819) 316, non Pursh. Rupr. Fl. Cauc. I, 230, 297; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 164. — *C. dahuricum* β *holosteuum* Ser. in DC. Prodr. I (1824) 415. — *C. nitens* Stev. ex Ser., l. c., nom. nud. — *C. dahuricum* β *elongatum* Gren. Monogr. Cerast. (1841) 13. — *C. nemorale* β *glabrescens* Fenzl in Ldb. Fl. Ross. I (1844) 400. — *C. nemorale* var. *unilaterale* Lipsky in Zap. Kievsk. Obshch. Estestv. XII (1892) 351. — Exs.: HFR no. 1314. — Russian name: yaskolka kavkazskaya [Caucasian].

444 Annual; the lower part of stems covered with crisp hairs all round, the upper part of stems and pedicels 1-sidedly; stems 15–40 cm long, ascending, branched; lower leaves spatulate, long-petioled; median lanceolate, sessile, obsoletely cordate at base, 2–6 cm long and 4–10 mm broad, sparsely pubescent, scabrous-margined; inflorescence paniculate; pedicels equaling to several times as long as calyx, spreading or recurved after anthesis; sepals lanceolate, 6–10 mm long, acuminate, narrowly scarious margined, glabrous on the back except at pubescent base; petals equaling or 1.5–2 times as long as calyx, emarginate, the claws villous-ciliate; filaments woolly; capsule almost straight, 1.5–2 times as long as calyx, with circinate-revolute teeth; seeds tuberculate. April–June. (Plate XXIII, Figure 4).

Deciduous woods and scrub, at altitudes of 1,200–2,400 m. — Caucasus: Cisc., Dag., Main Range, S. Transc. (Lori). Endemic. Described from the Caucasus. Type in Leningrad.

13. *C. nemorale* M. B. Fl. taur. cauc. III (1819) 317; Gren. Monogr. Cerast. 14; Boiss. Fl. Or. I, 718, ex parte; Shmal'g., Fl. I, 160, excl. subsp.; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 164. — *C. nemorale* β *villosa* Fenzl in Ldb. Fl. Ross. I (1842) 401.

Annual; stems weak, ascending, more rarely erect, (8) 15–60 cm long, crisp-hairy; radical leaves ovate-spatulate; cauline lanceolate from subcordate base, subacute, 2–7 cm long and 0.3–2 cm broad, more or less

pubescent; inflorescence dichotomously branched, many-flowered; pedicels pubescent, equaling or 2—4 times as long as calyx, recurved after anthesis, finally reverting to upright; sepals lanceolate, acute, with narrow membranous margins, heavily pubescent, 6—10 mm long; petals lobed to one-third their length, equaling or scarcely shorter than calyx, the claws ciliate; filaments hairy; capsule twice as long as calyx, slightly curved, with circinate-revolute teeth; seeds rufous-brown, 0.7 mm long, densely tuberculate. April—July. (Plate XXIII, Figure 3).

Wood margins, scrub, boundaries, fallows, and cultivated fields. Rising in mountains to 1,200 m. — European part: Bl., Crim. (rare), L. Don; Caucasus: Cisc., W., E., and S. Transc., Tal. Endemic. Described from the vicinity of Voroshilovsk. Type in Leningrad.

Series 3. *Oreades* Schischk. — Roots moniliform or fusiform; sepals glabrous, lustrous; leaves amplexicaul.

14. *C. dahuricum* Fisch. in Hort. Gorenk. (1812) nom. nud.; descr. in Spreng. Pug. pl. minus cognit. II (1815) 65; Gren. Monogr. Cerast. 13 excl. var. *elongatum*; Fenzl in Ldb. Fl. Ross. I, 401; Turcz. Fl. baic.-dahur. I, 241; Shmal'g., Fl. I, 160. — *C. amplexicaule* Sims. Bot. Mag. (1816) tab. 1789; Rupr. Fl. Cauc. 221; Voron. in Fom. and Voron., Opred. II, 2, 161, ex parte. — Ic.: Sims, l. c., tab. 1789. — Exs.: H. F. A. M. no. 451.

445 Perennial; roots moniliform; stems ascending, 50—100 cm long, sulcate, in lower part sparsely covered with long hairs, in upper part glabrous or pubescent (var. *pilosum* Rgl.); radical leaves narrowly oblong, the others oblong or ovate, 5—8 cm long and 1.5—3 cm broad, obtuse or acuminate, clasping at base; inflorescence a terminal many-flowered cyme; bracts large, leaflike; pedicels 2—7 cm long, recurved after anthesis; sepals ovate-lanceolate, 10—12 mm long and 3.5—5 mm broad, acute or obtusish, glabrous, lustrous; petals 1.5—2 times as long as calyx, lobed to one-fourth or one-third their length, ciliate at base; capsule straight, twice as long as calyx, with reflexed teeth. June—August.

Woods and wood margins, scrub, subalpine meadows, and meadows with tall herbaceous vegetation. — European part: Dv.-Pech.; Caucasus: Cisc., Dag., E., W., and S. Transc.; W. Siberia: Ob, U. Tob., Alt.; E. Siberia: Ang.-Say., Yenisei, Dau.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al.

Gen. distr.: Dzu.-Kash., Mong., As. Min. (?), Iran. (N. Iran.-Elburz mountains). Described from Transbaikalia. Type in Leningrad.

15. *C. hemschianicum* Schischk. in Grossh. Fl. Cauc. II (1930) 381 et in Acta Inst. Botan. Ac. Sc. URSS, ser. I, 2 (1936) 136. — *C. dahuricum* c.) *elatum* Som. et Lev. in A. H. P. XVI (1900) 86.

Perennial; roots fusiform or moniliform; stem ascending, 60—100 cm long, glabrous or in lower part pubescent; leaves ovate, 6 cm long and 2 cm broad, acute to subobtuse, sessile, amplexicaul, the upper smaller and bearing in their axils readily deciduous proliferous buds, these 1—2 cm long and 0.7—1.5 cm broad, consisting of imbricated lurid scalelike leaves; flowers at the ends of stems and branches in loose cymes; pedicels unequal; sepals lanceolate, acute, 13 mm long, glabrous, scarious at margins and at tips; petals white, lobed on one-third, twice as long as calyx; petal-claws

and filaments glabrous; capsule straight, slightly exceeding calyx, with cinate-revolute teeth; seeds muricate. July—August.

Taluses and mountain woods, mostly beech. — Caucasus: W. Transc.

Gen. distr.: Lazistan. Described from the Pontic Range (upper course of the Foruna-dere River). Type in Leningrad.

Note. Besides the root system, the feature characterizing this species is the presence of axillary proliferous buds. Since, however, these buds fall away easily and the plants are mostly collected without roots, it has been impossible to deduce the exact distribution area of *C. hemischnicum* from herbarium specimens.

16. *C. oreades* Schischk. in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, 2 (1936) 135. — *C. dahuricum* b) *diffusum* Som. et Lev. in A. H. P. XVI (1900) 86. — **lc.:** Schischk., l. c., f. 1.

446 Perennial; taproot fusiform, 8—12 mm in diameter; stems 5—9, 10—25 cm long, prostrate or ascending, sparsely crisp-hairy in lower part, glabrous above, simple or dichotomously branched at summit; leaves ovate, 1—3.5 cm long, 0.7—2 cm broad, with short hairs on the midrib beneath or all over the undersurface, acuminate or obtuse, half-clasping at base, the margin beset with short hairs; radical leaves marcescent; flowers in terminal cymes of 3—7, rarely up to 20; pedicels glabrous, 0.6—3 cm long, spreading or drooping after anthesis; bracts herbaceous, ovate, acute; sepals ovate-lanceolate to lanceolate, 6—9 mm long, obtuse, broadly scarious-margined, glabrous, lustrous; petals 1.5—2 times as long as calyx, 2-cleft to one-third or half the length; capsule oblong, 1.5 times as long as calyx, with circinate-revolute teeth; seeds reniform-rotund, bluntly tuberculate, ca. 2 mm in diameter. July.

Alpine taluses and near thawing snow. — Caucasus: Greater Caucasus (W. part), W. Transc. (Mingrelia). **Gen. distr.:** Turkey (Pontic Range). Described from the Mamison Pass. Type in Leningrad.

Series 4. Perfoliata Schischk. — Leaves connate at base in pairs; glabrous annuals.

17. *C. perfoliatum* L. Sp. pl. (1753) 437; Fenzl in Ldb. Fl. Ross. I, 402; Boiss. Fl. Or. I, 719; Shmal'g., Fl. I, 160; Voron. in Fom. and Voron., Oprod. rast. Kavk. II, 162. — **lc.:** Wilkomm *lc. et Descr. Pl. Hispan. I* (1852) t. 56. — **Exs.:** Fl. cauc. exs. no. 170; H. F. A. M. no. 454.

Annuals, quite glabrous throughout; stem erect, simple or branched, 7—40 cm long, finely sulcate; lower leaves oblong-elliptic, tapering to a petiole, obtusish, the margin, especially on petiole, often ciliate (var. *ciliatum* Schischk.); cauline leaves oblong or broad-ovate, with glabrous wavy margin, connate at base, 3.5—4.5 cm long and 1—1.5 cm broad; pedicels filiform, many times as long as petiole, erect in fruit; bracts herbaceous; sepals oblong, acutish, 6—10 mm long, minutely tuberculate on the back; petals shorter than calyx, emarginate or shallowly 2-lobed; petal-claws and filaments glabrous; capsule somewhat enlarged at base, gradually attenuate toward summit, 1.5—3 times as long as calyx; seeds sharply tubercled, 1.5 mm long. April—May. (Plate XXIII, Figure 5).

Grassy and stony slopes, scrub, meadows, gardens, and among cultivated fields. — European part: Bl., L. Don, Crim.; Caucasus: Cisc., E. and S. Transc.; Centr. Asia: T. Sh., Syr D., Pam.-Al., Mtn. Turkm. Gen. distr.: Med., Bal.-As. Min., Arm.-Kurd. Described from Greece. Type in London.

47 ★18. *C. chlorifolium* Fisch. et Mey. in Index IV sem. Hort. Petropol. (1837) 34; Gren. Monogr. Cerast. 12; Boiss. Fl. Or. I, 719; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 163. — *C. tournefortii* Gren. Monogr. Cerast. (1841) 11; Fenzl in Ldb. Fl. Ross. I, 402. — *C. fischeri* Gren., l. c. (1841) tab. 1, non Ser. — Ic.: Gren., op. cit., tab. 7.

Annual, glabrous, glaucous; stems erect, 20–30 cm long, branched; leaves ovate-oblong, the lower tapering to a long petiole, the others sessile, 2–3 cm long and 0.7–1 cm broad, connate at base; pedicels slightly longer than calyx, spreading or drooping after anthesis; sepals oblong, 5–10 mm long, acute, with scabrous margin, minutely tuberculate on the back; petals 1.5 times as long as calyx, lobed to one-third or less; petal-claws and filaments ciliate; capsule straight, 2–3 times as long as calyx; seeds small, ca. 0.5 mm long, with very short blunt tubercles. June.

Stony slopes. — Not encountered in the USSR but occurring in adjoining localities of Turkey (former Ol'ty District). Gen. distr.: Arm.-Kurd., As. Min. Described from Anatolia. Type in Leningrad.

Section 2. *SCHIZODON* (Fenzl) Schischk. — Subgen. *Schizodon* Fenzl in Endl. Gen. pl. (1841) 970. — Petals shorter than calyx, lobed; capsule cylindric-conical, many times as long as calyx, with erect teeth. Glandular-pubescent annuals.

19. *C. dichotomum* L. Sp. pl. (1753) 438; Gren. Monogr. Cerast., 44; Fenzl in Ldb. Fl. Ross. I, 402; Boiss. Fl. Or. I, 721; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 164. — *C. corniculatum* Crantz, Instit. II (1766) 403. — Ic.: Wilkomm, Ic. et Descr. Pl. Hispan. I (1852) t. 56. — Exs.: H. F. A. M. no. 452. — Russian name: yaskolka vil'chataya [same as for *C. furcatum*].

Annual, glandular-pubescent throughout; stems branched almost from base, 15–35 cm long; leaves lance-linear, subobtuse, 1.5–3.5 cm long and 3–6 mm broad, commonly overtopping internodes; inflorescence a contracted 5–11-flowered corymb; bracts herbaceous, small; pedicels erect, shorter than calyx; sepals oblong, acute, 7–10 mm long and 2.5–3 mm broad, scarcely accrescent after anthesis; petals obovate-oblong, 2-lobed, shorter than or nearly as long as calyx, the claws glabrous; filaments hairy at base; capsule cylindric-conical, straight or scarcely curved, 2–3 times as long as calyx; seeds small, 0.8 mm in diameter, finely tuberculate. March–May. (Plate XXIV, Figure 1).

Stony slopes and cultivated fields. — Caucasus: E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm., Pam.-Al., Syr D., T. Sh. (W.). Gen. distr.: W. Med., As. Min., Arm.-Kurd., Iran., Mesopotamia. Described from Spain. Type in London.

Economic importance. The plant occurs occasionally in the southern regions of the USSR as a weed of cereal crops but it does not cause any serious damage.

448 20. *C. inflatum* Link in Desf. Cat. Hort. Par. (1818) 462; Gren. Monogr. Cerast., 45; Boiss. Fl. Or. I, 721; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 164. — Ic.: Berg. et Diratz. Contrib. Fl. Armen. Turc. I, fig. 2.

Annual, glandular-pubescent throughout; stems branched almost from base, 5–20 cm long; leaves lance-linear, subobtuse, 1–1.5 cm long and 2–5 mm broad; inflorescence 3–7-flowered; bracts herbaceous, ovate; pedicels erect, shorter than calyx; calyx ovoid-globose, inflated; sepals oblong, acute, with narrow white scarious margin, 10–11 mm long and 4–5 mm broad, finally elongating to 6–8 mm; petals shorter than calyx, ovate-oblong, emarginate or shallowly 2-lobed; filaments hairy at base; capsule cylindric-conical, almost straight, twice as long as calyx; seeds small, 0.8 mm in diameter, finely tuberculate. March–April. (Plate XXIII, Figure 6).

Dry and gravelly slopes and fields. — Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm., Syr D., Pam.-Al., T. Sh., Dzu.-Tarb. **Gen. distr.:** As. Min., Arm.-Kurd., Iran. Described from Iran. Type in Paris.

Economic importance. Occurs among crop plants, like the preceding species, but does not cause any serious damage.

Section 3. **ORTHODON** Ser. in DC. Prodr. I (1824) 415. — Subgen. *Orthodon* Fenzl in Ldb. Fl. Ross. I (1842) 403. — Capsule cylindric, with erect or divergent involute-margined teeth.

Subsection 1. **FUGACIA** Fenzl in Ldb. Fl. Ross. I (1842) 403. — Annuals, without sterile axillary branchlets.

Series 1. **Ciliatopetala** Fenzl in Ldb., l. c. (1842). — Petal-claws ciliate-bearded or merely at base ciliate; stamens hairy or glabrous.

21. *C. longifolium* Willd. Sp. pl. II (1799), non Poir. nec Ten.; Gren. Monogr. Cerast. 43; Fenzl in Ldb. Fl. Ross. I, 403; Boiss. Fl. Or. I, 721; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 165. — *C. blepharostemon* Fisch. et Mey. in Bull. Soc. Nat. Mosc. (1838) 403. — Ic.: Gren., op. cit., tab. 4.

Annual, covered in lower part with appressed crisp hairs, in upper part with short glandular hairs; stems 5–30 cm long, erect, branched or simple; leaves oblong, the median cauline 1.5–2.5 cm long and 3–5 mm broad, sessile, subacute, about equaling internodes; inflorescence many-flowered, lax; bracts herbaceous; pedicels equaling or 2–4 times as long as calyx, spreading after anthesis; sepals lance-oblong, 6–10 mm long, glandular-pubescent, glabrous at apex, acuminate, scarious-margined; petals slightly exceeding calyx, cuneate-obovate, 2-cleft nearly to the middle, alternately pubescent at base; capsule straight, slightly exceeding to twice as long as calyx; seeds bluntly tuberculate, ca. 0.75 mm long. June–July.

149 Stony and grassy slopes and taluses. — Caucasus: E. Transc. (between the villages of Kozanzamy and Dolashlyar), S. Transc., Tal. (Zuvant). **Gen. distr.:** Arm.-Kurd., Iran. (Iran, Kurdistan). Described from Armenia. Type in Berlin.

22. **C. ruderale** M. B. Fl. taur.-cauc. I (1808) 357; Gren. Monogr. Cerast. 57; Fenzl in Ldb. Fl. Ross. I, 403; Boiss. Fl. Or. I, 722; Shmal'g., Fl. I, 161; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 165. — Ic.: Gren., op. cit., tab. 5.

Annual, covered throughout with spreading hairs, in upper part also with glandular hairs; stem solitary, erect, simple or branched, 5–40 cm long; leaves sessile, ovate, obtuse or subacute, rounded at base, 1–3.5 cm long and 4–15 mm broad, usually much shorter than internodes; inflorescence many-flowered; bracts leaflike; pedicels equaling to several times as long as calyx, recurved after anthesis; sepals lanceolate, acute, with membranous margins, 5–13 mm long and 2–3 mm broad; petals slightly longer or shorter than calyx, lobed to one-fourth, the claws ciliate; filaments densely ciliate at the very base; capsule cylindric, 2–3 times as long as calyx, slightly curved, the erect teeth with revolute margins; seeds ca. 1 mm long, brown, sharply tuberculate. April–May.

Meadows, scrub, dry slopes, fields, including cultivated fields. — Caucasus: Cisc., Dag., E. and S. Transc. Endemic. Described from the vicinity of Kizlyar. Type in Leningrad.

Economic importance. Sometimes infesting crops, where it may develop in considerably quantity.

23. **C. tauricum** Spreng, Nov. Provent. (1818) 10. — **C. brachypetalum** Fenzl in Ldb. Fl. Ross. I, 403, non Desp.; Boiss. Fl. Or. I, 723; Shmal'g., Fl. I, 161; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 166, non Desp. — **C. brachypetalum** β **tauricum** Kern. Schedae ad Fl. exs. Austro-Hung. I (1883) 381. — **C. brachypetalum** α **viscidum** Gren. Monogr. Cerast. (1841) 37. — Exs.: HFR no. 2969; Fl. exs. Austr.-Hung. no. 555.

Annual; stem 8–15 cm long, simple or branched, covered like the leaves with soft hairs, the upper part of stem often glandular-hairy; leaves elliptic or oblong, the lower subspatulate, tapering to a petiole, the cauline sessile, 0.5–2 cm long and 3–8 mm broad; inflorescence a loose cyme; fruiting pedicels 2–3 times as long as calyx, 8–12 mm long; sepals 4–5 mm long, the outer 1–2 mm broad, covered on the back up to the apex with long hairs interspersed with glandular ones; petals oblong-cuneate, lobed to one-fourth, ciliate at base, shorter than to equaling calyx; filaments long-hairy in lower part; capsule 1.5 times as long as calyx, curved at summit; seeds almost round, flattened, 0.5–0.6 cm long. April–May.

Scrub, stony slopes, and pebbly or sandy banks of streams. — European part: Crim.; Caucasus: Cisc., Dag., E. Transc., Tal. **Gen. distr.:** Scand. (S.), Centr. and Atl. Eur., W. Med., Bal.-As. Min. Described from the Crimea. Type in Berlin.

24. **C. glomeratum** Thuill. Fl. Par. ed. II (1799) 225; Shmal'g., Fl. I, 162; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 166. — **C. viscosum** L. Sp. pl. (1753) 51 ex parte; Gren. Monogr. Cerast. 25; Fenzl in Ldb. Fl. Ross. I, 404; Boiss. Fl. Or. I, 722. — Ic.: Hegi, Ill. Fl. Mittel-Eur. III (1909) t. 105. — Exs.: HFR no. 1011.

Annual; stem 10—20 cm long, branched at summit, covered, like the leaves, with rather long spreading hairs, at summit glandular; leaves ovate sometimes suborbicular, 4—22 mm long and 2—12 mm broad; flowers in dense cymes at the ends of stem and branches; pedicels short, not exceeding calyx, glandular-pubescent; sepals ovate-lanceolate, 3—4.5 mm long, acutish, long-bearded apically; petals white, equaling the calyx (var. *corollinum* (Fenzl) Rouy et Foucaud) or exceeding it (var. *spurium* (Posp.) Asch. et Gr.), lobed to one-fourth or one-third, sometimes wanting (var. *apetalum* (Dum.) Kitt.); capsule twice as long as calyx, curved, with erect revolute-margined teeth; seeds small, sharply tubercled. April—June.

Sandy and pebbly banks of streams and seashores, open woods, scrub, roadsides, vegetable and ornamental gardens, fields, and near houses. — European part: Lad.-Ilm., U. Dnp., M. Dnp., V.-Don, L. Don, Bl., Crim.; Caucasus: Cisc., Dag., W., E., and S. Transc., Tal.; Centr. Asia: Pam.-Al. (Vakhsh River below the village of Nurek, Sobak, Shaarkgauz station), Mtn. Turkm. **Gen. distr.:** Scand., Centr. and Atl. Eur., Med., Bal.-As. Min., N. and S. Afr., N. and S. Am., Aust. Described from the vicinity of Paris. Type in Paris.

Series 2. *Leiopetala* Fenzl in Ldb. Fl. Ross. I (1842) 405. — Petal-claws and filaments glabrous.

25. *C. semidecandrum* L. Sp. pl. I (1753) 438; Gren. Monogr. Cerast. 28; Boiss. Fl. Or. I, 723; Shmal'g., Fl. I, 162; Voron. in Fom. and Voron., Oprod. rast. Kavk. II, 2, 166. — *C. semidecandrum* α *scarioso-bracteatum* Fenzl in Ldb. Fl. Ross. I (1842) 405, ex parte. — *C. pentandrum* Krock. Fl. Siles. II, 1 (1790) 81. — Ic.: Bonnier, Fl. Compl. France, Suisse et Belge II (1912) 90. — Exs.: HFR no. 607.

451 Annual or biennial; stem erect, simple or sparingly branched only in the inflorescence, 5—20 cm long, covered, like the leaves, with short hairs as well as glandular; leaves broad-ovate or oblong, 4—8 mm long and 2—6 mm broad; inflorescence cymose; bracts scarious to the middle or to one-third; pedicels equaling to twice as long as calyx; sepals ovate, 3.5—4.5 mm long, usually scarious down to the middle, acute; petals white, obovate, emarginate or lobed, to one-fourth or one-third, somewhat shorter than to equaling calyx; stamens 5, rarely more; capsule 1.5 times as long as calyx, scarcely curved. April—May.

Stony and sandy slopes, pinewoods and their borders, scrub, seaside sands, and fields. — European part: Lad.-Ilm., U. Dnp., M. Dnp., Bl., V.-Kama, L. V., L. Don, Crim.; Caucasus: Cisc., Dag., W. and E. Transc., Tal. **Gen. distr.:** Scand. (S.), Centr. and Atl. Eur., W. and E. Med., Bal.-As. Min. Described from N. Europe. Type in London.

26. *C. dentatum* Möschl. in Oesterr. Bot. Zeitschr. 82, 3 (1933) 230. — *C. semidecandrum* α *scarioso-bracteatum* Fenzl in Ldb. Fl. Ross. I (1842) 405, ex parte. — Exs.: H. F. A. M. no. 455.

Annual; stem erect, simple, only in the inflorescence sparingly branched, 3—15 cm long; stem and leaves covered with simple as well as glandular hairs; leaves ovate or lance-oblong; flowers in a few-flowered terminal

cyme; pedicels equal to or twice as long as calyx, usually recurved after anthesis; sepals ovate, ca. 3.5–4 mm long, scarious in upper one-third to one-half, acute, glandular-pubescent on the back; petals white, oblong or narrowly ovate to linear, one-half to two-thirds as long as calyx, unequally 3-toothed at apex or shallowly 2-lobed; stamens 5, with anthers 0.26 mm long; capsule about twice as long as calyx, slightly curved at summit; seeds round, flattened, dark brown, 0.4–0.6 mm long, covered with flat or rather sharp tubercles. April.

Stony slopes. — European part: L. V., Crim.; Caucasus: Cisc.; W., E., and S. Transc.; Centr. Asia: Syr D., Pam.-Al. **Gen. distr.:** W. Med., S. part of the Balkan Peninsula, As. Min.? Described from S. Europe, the Crimea, and SE regions of the European part of the USSR. Type in Vienna.

Note. A species separated fairly recently from *S. semidecandrum* L., with as yet insufficiently clarified distribution and in need of further study.

27. *C. alexeenkoanum* Schischk. in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, III (1936).

452 Annual, glabrous throughout and somewhat glaucous; stem 6–15 cm long, ascending at base or erect, simple or branched in the inflorescence; lower leaves ovate-spatulate, gradually tapering to a rather long broad petiole, the median and upper sessile, 6–12 mm long and 3–5 mm broad, 1-nerved, mucronate or obtuse, slightly connate at base; flowers 4–10 in a terminal dichasium; sepals ovate-lanceolate, 3–3.5 mm long and ca. 1 mm broad, scarious-margined, acute; petals none; stamens 5; styles 5; capsule cylindric, 2–2.5 times as long as calyx, slightly curved, dehiscent by 10 teeth, these erect, with revolute margins; seeds triangular-reniform, ca. 0.5 mm in diameter, tuberculate on the back and with obscure flat tubercles at margins. August.

Slopes in the alpine zone. — Centr. Asia: Pam.-Al.: Panj River near the village of Shitkarv at an altitude of ca. 2,800 m (Alekseenko). Endemic. Described from the location indicated. Type in Leningrad.

28. *C. glutinosum* Fries Novit. Fl. suec. ed. I (1817) 51; Boiss. Fl. Or. I, 724. — *C. semidecandrum* β herbaceo-bracteatum Fenzl in Ldb. Fl. Ross. I (1842) 405. — *C. semidecandrum* β glutinosum Rchb. Fl. germ. excurs. (1832) 795; Shmal'g., Fl. I, 162. — *C. semidecandrum* β pumilum M. B. Fl. taur.-cauc. I (1808) 359. — *C. pumilum* Stev. Verzeichn. (1857) 89, non Curt. — *C. pallens* F. W. Schultz, Fl. Gall. Germ. exs. Cent. I, Introd. (1836) 6. — *C. pumilum* ssp. *pallens* Schinz u. Thell. Bull. Herb. Boiss. 2 sér. VII (1907) 402. — Exs.: Fl. Finl. exs. no. 640.

Annual; stem erect or at base scarcely ascending, 3–20 cm long, branched covered with mostly glandular hair; leaves elliptic or broad-ovate, 3–8 mm long and 2–5 mm broad, the lower and radical tapering to a petiole, the others sessile, hairy; flowers in rather dense few-flowered cymes at the ends of stem and branches; bracts ovate, scarious at margin and tips; pedicels glandular-pubescent, 1.5–2 times as long as calyx, recurved after anthesis, reverting to upright in fruit; sepals ovate, 3.5–4.5 mm long, scarious at margins and at apex, glandular-pubescent on the back, acute; petals emarginate, equaling or slightly exceeding calyx;

stamens 10; capsule 1.5–2 times as long as calyx, slightly curved.
May–July.

Sandy shortgrass meadows, solonchic steppes, and stony slopes. — European part: U. Dnp. (Kiev), Bl. (Askaniya-Nova), Crim.; Caucasus: Cisc., W. Transc. (Gelendzhik), E. Transc. **Gen. distr.:** Scand., Centr. and Atl. Eur., W. Med., Bal. Described from Sweden. Type in Stockholm.

Note. *C. pumilum* Curt. is apparently a species distinguishable from *C. glutinosum* Fries. It has not yet been found in the USSR.

29. *C. schmalhauseni* Pacz. in Zap. Kievsk. Obshch. Estestv. X, 2 (1889) 423; Shmal'g., Fl. I (1895) 161. — *C. riaei* Auct. Fl. Ross., non Desm. — Ic.: Pacz., l. c. (1889) tab. VII, fig. 1–6. — Exs.: HFR, no. 11.

453 Annual, glandular-pubescent throughout; stem profusely dichotomously branched from base or from the middle, 6–14 cm long; radical leaves long-persistent, broad-obovate, obtuse, tapering at base, 4–10 mm long and 2.5–4 mm broad; cauline oblong or lance-linear, 5–15 mm long and 1–3 mm broad; pedicels considerably elongating in fruit; bracts herbaceous, narrowly scarious-margined; sepals ovate-lanceolate, acute, distinctly 3–5-nerved, more or less scarious-margined, 3.5–5.5 mm long; petals pale rose, oblong, emarginate, equaling or scarcely exceeding calyx, glabrous at base; capsule twice as long as calyx, slightly curved; seeds small, 0.4 mm long, smooth. April–May.

Stony slopes and sandy places. — European part: Bl., Crim. Endemic. Described from the vicinity of Nikolaev. Type in Kiev; cotype in Leningrad.

Subsection PERENNIA Fenzl in Ldb. Fl. Ross. I (1842) 406. — Perennials.

Series 1. *Lasiostemona* Fenzl in Ldb. Fl. Ross. I (1842) 406. — Filaments hairy.

30. *C. meyerianum* Rupr. Fl. cauc. (1869) 221 in textu sub *Stellaria media*; Boiss. Fl. Or. Suppl. 119; Shmal'g., Fl. I, 161; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 165. — *Stellaria meyeriana* Rupr., l. c. (1869) 297. — Ic.: Rupr., op. cit., tab. V, fig. 3.

Perennial, softly pubescent throughout; lower leaves ovate, with blade 4–6 cm long and 1.5–2.5 cm broad, tapering to a long petiole; upper lanceolate, 4 cm long and 0.8 cm broad, acute, short-petioled or sessile; flowers 5–9 at the end of stem; pedicels pubescent, sometimes 1-sidedly, about as long as or slightly longer than calyx; bracts herbaceous, linear-lanceolate, acuminate; sepals lance-ovate, 9–11 mm long and ca. 3 mm broad, glabrous, acuminate, scarious-margined; petals shorter or longer than calyx, lobed to one-fifth or one-fourth; filaments hairy; capsule oblong, about as long as calyx, with erect revolute-margined teeth. July–September.

Woods. — Caucasus: Cisc., Endemic. Described from Mt. Beshtau and Ordzhonikidze. Type in Leningrad.

31. *C. purpurascens* Adams ap. Web. et Mohr. Cat. 1 (1805) 60; Fenzl in Ldb. Fl. Ross. I, 406; Boiss. Fl. Or. I, 729; Rupr. Fl. cauc. 235; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 169. — *C. frigidum* M. B. Fl.

taur.-cauc. I (1808) 362. — *C. collinum* ? Ind. sem. Hort Dorpat. 1832 et in Flora I (1832) 122, non Salisb. (1796). — *C. umbellatum* C. Koch in Linnaea XV (1841) 708. — *C. ruderale* β *macrosperrum* Rupr. Fl. cauc. (1869) 232. — *C. purpurascens* var. *subacaulis*, tenui-caulis et parviflora Trautv. in A. H. P. II, 2 (1873) 514. — Ic.: Gren. Monogr. Cerast. tab. 8.

Perennial, covered in lower part with articulate hairs, in upper part often glandular; stems ascending, 2–50 cm long, branched at summit; radical leaves oblong-elliptic, subacute, pubescent, tapering to a petiole, this as long as or longer than blade, ciliate at base; cauline ovate-lanceolate, sessile, connate at base; inflorescence terminal, cymose, 2–10-flowered, or rarely stem monanthous; pedicels longer than calyx, drooping after anthesis; sepals ovate, 5–12 mm long, acute, pubescent on the back, often purple-tinged at margin and at apex; petals obovate, 2–3 times as long as or rarely equaling calyx, white outside, yellowish-green inside, deeply lobed, hairy and ciliate at base; filaments woolly-pubescent in lower part; capsule cylindric, 2–3 times as long as calyx; seeds sharply tuberculate, 0.8–2 mm long. June–August.

Alpine and subalpine meadows, thickets of *Rhododendron caucasicum*, grassy and gravelly mountain slopes. — Caucasus: Greater Caucasus, Dag., E., W., and S. Transc., Tal. Gen. distr.: Arm.-Kurd. Described from the Main Caucasus Range (Ossetia). Type in Moscow.

Note. Extremely variable in various features, such as plant size, leaf shape, petal shape and size, seed size, and vesture. Ruprecht (l. c.) established var. *microsperrum* to account for specimens with seeds not exceeding 1 mm in length. Trautvetter (l. c.) also established a number of varieties of rather doubtful significance.

32. *C. furcatum* Cham. et Schlecht. in Linnaea I (1826) 61. — *C. rigidum* Ldb. in Mém. de l'Acad. Sc. de St. Pétersb. V (1815) 538, non Vitm. (1789); Fenzl in Ldb. Fl. Ross. I, 407; Turcz. Fl. baic.-dahur. I, 244. — *C. vulgatum* ϵ *glaucum* Fenzl in Ldb. Fl. Ross. I (1842) 409. — *C. ciliatum* Turcz. in Bull. Soc. Nat. Mosc. XV (1842) 616, non Waldst. et Kit. (1805). — *C. rubescens* Mattf. in Notizblats Bot. Gart. u. Mus. Berlin-Dahlem XI, no. 105 (1932) 333. — *C. amurense* Ohwi in Acta Phytotax. et Geobot. 4 (1935) 32, excl. syn. — *C. ciliatulum* Ohwi in Journ. Japan. Bot. XII, no. 5 (1936) 334. — Russian name: yaskolka vil'chataya [same as for *C. dichotomum*].

Perennial; stems ascending at base, then erect, 20–60 cm high, branched in the inflorescence, hairy, the hairs in lower part retrorse crisp, in middle part spreading, in inflorescence glandular; leaves ovate or lanceolate, 2–3 cm long and 5–11 mm broad, covered on both surfaces and on the margin with rather long hairs, sessile or the lower gradually tapering to a short petiole; bracts herbaceous, scarious-margined; pedicels glandular-hairy, 1–3.5 cm long, horizontally spreading after anthesis; sepals ovate, obtusish, scarious-margined, covered on the back with long spreading hairs, ca. 5 mm long; petals 1.5–2 times as long as calyx, cleft to one-third into oblong lobes, long-ciliate at base; filaments glabrous or ciliate; capsule cylindric, 2–3 times as long as calyx, slightly curved at summit, the erect teeth revolute-margined; seeds ca. 1 mm in diameter, sharply tuberculate. July–August.

Open woods, meadows, and shore pebbles. — E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Okh. **Gen. distr.:** Mong., China. Described from plants collected by Redovskii in Siberia. Type in Leningrad.

Series 2. *Leiostemona* Fenzl in Ldb. Fl. Ross. I (1842) 407. — Filaments glabrous; petals shorter to slightly longer than calyx.

33. *C. caespitosum* Gilib. Fl. Lith. V (1781) 159; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 167; Hultén, Fl. Kamtch. II, 73; Kryl., Fl. Zap. Sib. V, 1012. — *C. vulgatum* L. Sp. pl. ed. II (1762) 267 part.; Fenzl in Ldb. Fl. Ross. I, 408, ex parte; Boiss. Fl. Or. I, 726; Kom., Fl. Manchzh. II, 183; Fl. Kamch. II, 93. — *C. viscocum* L. Sp. (1753) 437, pro parte; Turcz. Fl. baic.-dahur. I, 242. — *C. triviale* Link, Enum. Hort. Berol. I (1821) 433. — Ic.: Hegi, Ill. Fl. Mittel-Eur. III (1909) t. 105. — Exs.: HFR no. 1562.

Perennial, biennial, or annual, 10–30 cm high, with procumbent sterile and ascending flowering stems; stem and leaves covered with short hairs, at summit glandular, or sometimes the whole plant glandular-pubescent; leaves oblong-ovate or oblong, the lower tapering to a short petiole, the others sessile, 1–3 cm long and 3–10 mm broad; flowers in a rather dense terminal cyme; fruiting pedicels 2–3 times as long as calyx; bracts herbaceous, scarious-margined; sepals acuminate, 5–6 mm long, scarious at margins and at tips, hairy on the back; petals lobed to one-third, equaling or shorter than calyx; capsule twice as long as calyx. May–July.

Groves, open woods, scrub, meadows, pastures, fields, near houses, and at roadsides; rising in mountains into the alpine zone. — European part: all regions except the Arctic; throughout the Caucasus and Siberia; Far East: Ze.-Bu., Okh., Uss., Kamch. (introduced), Uda. **Gen. distr.:** Scand., Centr. and Atl. Eur., Med., Bal.-As. Min., Iran. (N. Iran), Mong., Jap.-Ch., Afr., Am., New Zealand, Antarctic islands. Described from Lithuania. Type in Kiev?

Economic importance. A frequent weed of crop fields.

456 **Note.** This species is often incorrectly classified in herbaria. This is due to the fact that *C. caespitosum* is sometimes an annual plant and it is often confounded with *C. semidecandrum*, since the sepals are glabrous at apex in both species. *C. semidecandrum* L. may, however, be distinguished by various characters, e. g., the larger calyx which attains 5–6 mm in length (in *C. semidecandrum* L. merely 3.5–4.5 mm), the bracts scarious only at margins (not to the middle), the crowded flowers, and the somewhat greater dimensions of the plant.

34. *C. tianschanicum* Schischk. in Acta Inst. Ac. Sc. URSS, ser. I, 2 (1936) 138. — Ic.: Schischk., l. c., fig. 2.

Perennial; stems ascending at base, branched at summit, 15–40 cm long, covered with simple as well as glandular hairs; radical leaves lance-linear, marcescent; cauline lanceolate, 3–4 cm long and 5–7 mm broad, glabrous or pubescent, sessile; flowers in loosely 2–8-flowered cymes at the ends of stems and branches; bracts small, hairy-margined; pedicels equaling to 2–3 times as long as calyx, spreading or drooping

after anthesis; sepals lanceolate, 6—7.5 mm long and ca. 2 mm broad, obtuse, glandular-pubescent on the back, scarious at margins and tips; petals white, slightly exceeding to 1.5 as long as calyx, obcordate, lobed to one-third; filaments and lower part of petals glabrous; capsule oblong-cylindric, twice as long as calyx, with erect revolute-margined teeth; seeds rounded-reniform, ca. 1 mm in diameter, finely and obtusely tuberculate. June—July.

In shortgrass meadows among coniferous woods and in subalpine meadows. — Centr. Asia: T. Sh., Dzu.-Tarb. (Dzungarian Ala Tau). Endemic. Described from the Trans-Ili Ala Tau and from the area of the Malaya Almatinka River. Type in Leningrad.

35. *C. beeringianum* Cham. et Schlecht. in Linnaea I (1826) 62. — *G. vulgatum* ♂ *beeringianum* Fenzl in Ldb. Fl. Ross. I (1842) 409. — *C. alpinum beeringianum* Rgl. Pl. Raddeanae (1862) 435. — *C. fischerianum* Tolm. in Trav. du Musée Bot. Ac. l'URSS XXI (1927) 84, 85, non Ser.; Kryl., Fl. Zap. Sib. V, 1014. — *C. alpinum* Kom. Fl. Kamch. II, 92, non L.

Perennial; stems 12—30 cm long, crowded and ascending at base, then erect; plants clothed throughout with unequal spreading hairs interspersed with glandular ones; leaves oblong, subobtuse or subacute, 10—20 mm long, 2.5—4 mm broad; inflorescence terminal, dichotomously branched, 3—7-flowered; bracts lanceolate, herbaceous; pedicels 7—25 mm long, often deflexed; sepals elliptic, ca. 4 mm long, acute or obtusish, broadly membranous-margined, hairy on the back; petals 1.5—2 times as long as calyx, emarginate or lobed to one-fourth; capsule 1.5 times as long as calyx, scarcely curved; seeds ca. 1 mm long, bluntly tubercled. June—July. (Plate XXIV, Figure 3).

Waterside rocks, scrub, and pebbly and sandy shallows. — Arctic: 457 Arc. Eur., Nov. Z., Arc. Sib., Chuk.; European part: N. Urals; W. Siberia: Ob; E. Siberia: Yenisei, Lena-Kol.; Far East: Kamch. Gen. distr.: Ber. Described from the shores of Eschscholtz Bay. Type in Leningrad.

36. *C. gorodkovianum* Schischk. sp. nova in Addenda, V, p. 671.

Perennial; rootstock slender, obliquely ascending; stems ascending at base, then erect, 5—16 cm long, in lower part whitish and glabrate, covered above with short spreading hairs interspersed with glandular ones; leaves elliptic or ovate, 6—20 mm long and 3—8 mm broad, subobtuse, the lower tapering to a long and broad petiole, the upper sessile and covered with rather long soft hairs; inflorescence terminal, cymose, loosely 2—5-flowered; pedicels glandular-pubescent, 5—7 mm long, often nodding; bracts ovate-lanceolate, scarious-margined at summit; sepals ovate, 5.5 mm long, glandular-pubescent, scarious-margined, acutish; petals slightly exceeding to one-third longer than calyx, 2-lobed to one-fourth or one-third, glabrous. June—July.

Sandy waterside shortgrass meadows in the forest belt. — European part: N. Urals (upper reaches of the Manya and Shchugor rivers). Endemic. Described from the upper reaches of the Manya River. Type in Leningrad.

37. *C. fischerianum* Ser. in DC. Prodr. I (1824) 419. — *C. unalaschenskense* Takeda in Kew. Bull. (1910) 381; Kom., Fl. Kamch. II, 94; Hultén Fl. Kamtch. IV. — *C. vulgatum* γ *macrocarpum* Fenzl in Ldb. Fl. Ross. I (1842) 409. — *C. orochoonorum* Tatewaki in Transact. Sapporo nat. Hist. Soc. XIV, 3 (1936) 181. — Ic.: Hultén Fl. of Kamtch. IV, 249, fig. 19.

Perennial, densely covered with spreading hairs; flowering stems ascending, 10–30 cm long; sterile shoots elongated, densely leafy; lower leaves of sterile shoots lanceolate, the others ovate to oblong-ovate, 0.7–3 cm long and 3–12 mm broad, acute or obtuse; flowers 3–9 in a rather dense terminal cyme; pedicels 0.5–2 cm long; bracts ovate, ca. 2.5 mm long, acute, herbaceous, narrowly scarious-margined; petals lobed to one-fifth or one-fourth, 1.5 times as long as calyx, with glabrous or slightly ciliate claws; capsule 2.5–3 times as long as calyx, slightly curved; seeds ca. 1 mm long, sharply tuberculate. July–August.

Seaside rocks and sandy seashores. — Far East: Kamch., Sakh., Uda, Uss. **Gen. distr.:** Arc. N. Am., Unalaska. Described from Kamchatka. Type in Geneva.

Series 3. *Alpina* Borza, Bot. Közlem. (1913) 50. — Axillary sterile shoots absent; petals 1.5–2 times as long as calyx.

458

38. *C. pusillum* Ser. in DC. Prodr. I (1824) 418; Schischk. Not. system. ex Herb. Hort. bot. Petrop. VI, 3 (1926) 3; Kryl., Fl. Zap. Sib. V, 1013. — *C. vulgatum* η *leiopetalum* Fenzl in Ldb. Fl. Ross. I (1842) 410. — *C. alpinum* var. *glandulifera* Trautv. in Bull. Soc. Nat. Mosc. XXXIII, 1 (1860) 161, non Koch. — *C. collinum* Hort. Dorpat. ex Flora XVI (1833) 122, non Salisb.

Perennial, rather densely tufted, flowering stems 5–15 cm long, covered with simple hairs, in upper part glandular; leaves elliptic or oblong-lanceolate, 5–15 mm long and 3–9 mm broad, obtuse or short-acuminate, the lower tapering to a short petiole, the others sessile; flowers in a rather loose terminal cyme, rarely solitary; pedicels 2–4 times as long as calyx; bracts herbaceous; sepals oblong-elliptic, 5–6 mm long and 1.5–2 mm broad, obtusish, pubescent on the back, scarious-margined; petals 1.5–2 times as long as calyx, obcordate, lobed to one-fourth; capsule cylindric, twice as long as calyx. June–July. (Plate XXIV, Figure 2).

Alpine moss-and-lichen and stony tundras, stony slopes, and alpine meadows. — W. Siberia: Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** Mongolian Altai, Tannu-Ola Range. Described from Fischer's illustration based on Siberian material. Type lost (?). Illustration in De Candolle's herbarium at Geneva.

39. *C. alpinum* L. Sp. pl. (1753) 439. — *C. alpinum* α *hirsutum*, β *lanatum*, γ *glabratum* Fenzl in Ldb. Fl. Ross. I, 412. — *C. hyperboreum* A. Tolm. in Scrifter om Svalbard og Ishavet no. 34 (1930) 6. — Ic.: A. Tolm., l. c., fig. 1.

Perennial, matted; stems numerous, 5–15 cm long, heavily pubescent; radical leaves elliptic or obovate, 7–15 mm long and 3–7 mm broad, round-tipped or subacute, densely covered with long hairs, finally often coriaceous, glabrous, lustrous, or sometimes always glabrous when young

(var. *glabratum* Fenzl); cauline leaves narrower, elliptic or obovate, obtuse or subacute, pubescent; bracts similar but smaller; pedicels densely clothed with glandular hairs; sepals ovate to ovate-lanceolate, 6.5–9 mm long, acute, scarious-margined, covered on the back with obliquely ascending hairs; petals 1.5–2 times as long as calyx, the ciliate limb lobed to one-third; capsule twice as long as calyx. July–August.

Stony tundras; also sandy, argillaceous, and grassy slopes. — Arctic: Arc. Eur., Nov. Z., Franz Josef Land; European part: Kar.-Lap. **Gen. distr.:** Scand. (N.), Iceland, Spitsbergen, mountains of Centr. Eur., Pyrenees, Bal., N. Amer., Greenland. Described from the European Alps. Type in London.

459

40. *C. regelii* Ostenf. in Vid.-Selsk. Skr. Math.-Nat. 1909 no. 8 (1910) 10. — *C. alpinum* γ *caespitosum* Malmgren in Ofv. af K. Vet.-Akad. Förh., Stockholm (1862) 242. — *C. edmonstonii* var. *caespitosum* G. Anderss. et Hesselman, Bih. till. K. Vet.-Akad. Handl. 26, III, no. 1 (1900) 61. — *C. serpyllifolium* M. B. ex Stev. in DC. Prodr. 1 (1824) 417, non Willd. — *C. alpinum* δ *serpyllifolium* Rgl. in Bull. Soc. Nat. Mosc., XXXV, 1 (1862) 444. — *C. vulgatum* ς *grandiflorum*, lusus 2 Fenzl in Ldb. Fl. Ross. 6 (1842) 412. — Ic.: Anders. et Hesselman, l. c., fig. 28 et tab. 4.

Perennial, matted; stems numerous, prostrate at base, then ascending, 5–20 cm long, clothed with short and sometimes crisp hairs, densely leafy in lower part; leaves broad-ovate, 3–6 mm long and 2.5–3 mm broad, obtuse, glabrous or slightly pubescent, obtuse or short-acuminate; flowers 1–5 on the stem; pedicels glandular-pubescent, 4–28 mm long; bracts herbaceous, resembling foliage leaves but smaller; sepals ovate, ca. 4 mm long and 1.5–2 mm broad, obtusish, scarious-margined, pubescent and often slightly violet-tinged; petals 1.5–2.5 times as long as calyx, lobed to one-fourth. July–August.

Pebble-and-sand shallows, dryish tundras, and slopes. — Arctic: Nov. Z., Arc. Eur. (Vaigach Island, Yugorskii Shar), Arc. Sib. (from the mouth of the Lena to the Ob). **Gen. distr.:** Spitsbergen. Described from the Arctic.

41. *C. bialynickii* Tolm. in Travaux du Musée botan. de l'URSS, XXI (1927) 81. — Ic.: Tolm., l. c., fig. 1.

Perennial, tufted, densely covered throughout with long hairs, producing at base reduced sterile shoots; flowering stems ascending at base, 2–17 cm long, simple, only in inflorescence very sparingly branched; leaves oblong-elliptic to narrowly elliptic, 5–12 mm long and 2.5–4 mm broad, subobtuse; flowers 1–5, terminal; bracts herbaceous, lanceolate, acutish; pedicels equaling to 2–3 times as long as calyx, erect, after anthesis spreading; sepals lanceolate to ovate-lanceolate, 5–7 mm long, narrowly scarious-margined, obtuse; petals somewhat shorter than calyx, 2-lobed to one-third; capsule cylindric, twice as long as calyx; seeds ca. 1 mm long. July–August.

Sandy hills, pebbly seashores, seaside slopes, and patchy tundras. — Arctic: Arc. Sib., Chuk. Endemic. Described from Dikson Island. Type in Leningrad.

42. **C. polymorphum** Rupr. Fl. Cauc. (1869) 237. — *C. alpinum* M. B. Fl. taur.-cauc. I, 361, non L. — *C. ovatum* α *glabratum* et β *rutilum* in Ldb. Fl. Ross. I (1842) 415. — *C. latifolium* α *latifolium*, β *lanceolatum* Fenzl, l. c., 415. — *C. ovatum* Boiss. Fl. Or. I, 729 quo ad pl. cauc., non Hoppe. — *C. latifolium* Boiss., l. c., 730 quo ad pl. cauc., non L.; Som. et Lev. in A. H. P. XVI. — *C. polymorphum* α *decumbens*, β *mollifolium*, γ *alpestre*, δ *myrtifolium*, β *latifolium*, η *viscidulum* Rupr. Fl. Cauc. (1869) 238–239. — *C. carinthiacum* Som. et Lev., l. c., 89, non Vest; Voron. in Fom. and Voron., Opred. rast. Kav. i Kryma II, 2, 167. — *C. carinthiacum* var. *elegans* Som. et Lev., l. c. (1900) 89. — *S. subsimile* Schischk. ex Grossh., Fl. Kav. II (1930) 383.

Perennial; stems ascending at base, then erect, 7–17 cm long, covered with short simple or glandular hairs or almost glabrous; radical leaves lance-linear, the median cauline ovate to ovate-lanceolate, glabrous or pubescent; bracts small, with pubescent margins; flowers 2–8 at end of stem; pedicels equaling to 2–3 times as long as calyx, deflexed after anthesis, finally again erect; sepals lanceolate, 5–8 mm long and 1.5–2 mm broad, obtuse, pubescent on the back, scarious-margined; petals white, obcordate, twice as long as calyx, deeply 2-lobed; filaments glabrous; capsule oblong-cylindric, twice as long as calyx, the teeth erect. July–August. (Plate XXIV, Figure 4).

Taluses and stony slopes in the alpine zone, at altitudes of 2,000–3,350 m. — Caucasus: Greater Caucasus. Endemic. Described from the alpine zone of the Main Caucasus. Type in Leningrad.

Note. The plant, distributed in the Greater Caucasus and endemic to it, displays great variability; this has given rise to the establishment of a great number of varieties. As already demonstrated by Ruprecht, the Caucasian plant differs markedly from the European species *C. latifolium*, *C. ovatum*, and *C. carinthium*, with which it was identified by various authors (see above). The species established by Ruprecht was not acknowledged by later authorities and we reestablish it now.

Series 4. *Arvensia* Hayek, Fl. Steierm. I (1908) 301. — Sterile shoots, represented by leafy tufts, borne in the leaf axils; petals twice as long as calyx.

43. **C. arvense** L. Sp. pl. (1753) 438; Fenzl in Ldb. Fl. Ross. I, 452; Kom., Fl. Manch. II, 182; Boiss. Fl. Or. I, Smal'g., Fl. I, 163; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2, 167; Kryl., Fl. Zap. Sib. V, 1015. — *C. incanum* Ldb. in Mém. Ac. Sc. Pétersb. V (1815) 540; Turcz. Fl. baic.-dahur. I, 243. — Ic.: Ldb. Ic. Fl. Ross. II, tab. 149. — Exs.: HFR no. 406; Pl. Finl. exs. no. 634, 635.

463 Perennial; stems profusely branched at base, with prostrate and ascending sterile shoot; flowering stems 10–40 cm long, covered in lower part with short retrorse hairs, in upper part these interspersed with glandular hairs, or sometimes the whole plant glabrous (var. *glabellum* (Turcz.) Fenzl), with elongated upper internodes; leaves lanceolate or broadly linear (var. *angustifolium* Fenzl), 1–2 cm long and 1.5–4 mm broad, sometimes ovate-oblong (var. *latifolium*



PLATE XXIV. 1. *Cerastium dichotomum* L.— 2. *C. pusillum* Seringe.— 3. *C. belhringianum* Cham. et Schlecht.— 4. *C. polymorphum* Rupr.— 5. *C. argenteum* M.B.— 6. *C. ponticum* Albov.

Fenzl), subacute, covered with short hairs, with axillary fascicles of varying length; flowers in a loose terminal cyme; bracts scarious at apex and at margins; pedicels 2—3 times as long as calyx; sepals ovate-lanceolate, 4—6 mm long and 1.5—2 mm broad, obtusish, covered with short glandular hairs, broadly scarious-margined; petals 2—2.5 times as long as calyx, lobed to one-third; capsule slightly exceeding to 1.5 times as long as calyx, scarcely curved at summit, with erect revolute-margined teeth. May—August.

In meadows, open woods, and scrub, near houses and in fallows. — Arctic: Arc. Eur., Arc. Sib., An. (S.); European part: Lad.-Ilm., Dv.-Pech., V.-Kama, U. V., U. Dnp., M. Dnp., V.-Don; W. and E. Siberia: all regions; Far East: Uda, Okh., Uss.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** Scand., Centr. and Atl. Eur., Mong., Dzu.-Kash., Jap.-Ch., N. Am. Described from Scandinavia and S. Europe. Type in London.

Series 5. **Grandiflora** Borza, Bot. Közlem. (1913) 6. — Stems and leaves white-woolly with slender crisp hairs; capsule with erect or revolute teeth.

44. **C. biebersteinii** DC. in Mém. Phys. Gen. I (1822) 436; Gren. Monogr. Cerast. 22 ex parte; Fenzl in Ldb. Fl. Ross. I, 414; Boiss. Fl. Or. I, 727; Shmal'g., Fl. I, 163; Voron. in Fom. and Voron., Oprod. II, 2, 169. — *C. repens* M. B. Fl. taur.-cauc. I, 360, non L. — Ic.: DC. Pl. rares Genève, (1929) 11. — Exs.: HFR no. 309; Dörfl. Herb. norm. no. 4705.

Perennial, densely white-tomentose throughout, with procumbent sterile shoots and ascending flowering stems 10—25 mm long; leaves linear to oblong-linear, 2—4 cm long and 3—6 mm broad, subacute, with flat margins; flowers in a loose terminal cyme; pedicels erect, 0.3—2.5 cm long; bracts oblong-lanceolate, narrowly scarious-margined; sepals lanceolate, acute, membranous-margined, 7—10 mm long; petals white, 2—3 times as long as calyx, obcordate, gradually tapering toward base, lobed to one-fourth or one-third, glabrous; capsule cylindric, scarcely curved, nearly twice as long as calyx, with erect flattish teeth; seeds reniform-triangular, finely tuberculate, 1—2 mm in diameter. End of May, June—July.

Stony slopes and rocks. — European part: Crim. Endemic. Described from cultivated plants raised in Geneva from seeds sent by M. Bieberstein from the mountainous part of the Crimea. Type in Geneva.

464 Note. *C. biebersteinii* is an endemic Crimean plant, very widespread in the mountainous part of the Crimea. It displays the closest relationship to *C. szowitsii* Boiss. (E. Transcaucasia) and *C. argenteum* M. Bieb. (Central Transcaucasia) which are similarly white-tomentose but differ in some other characters. Early investigators identified the Crimean plant with *C. tomentosum* L., although this species is confined to the central and southern parts of Italy. *C. biebersteinii* DC. does not occur in a wild state outside the Crimea. The report by Taliev and Voinovskii referring to the occurrence of this species in inundated meadows of [the former] Buguruslan County of Samara Province is certainly wrong.

Economic importance. *C. biebersteinii* is now widely cultivated in gardens of W. Europe as an ornamental plant, especially for covering rocks and stony plots.

45. *C. argenteum* M. B. Fl. taur.-cauc. I (1808) 361; Voron. in Fom. and Voron., Oprod. rast. Kavk. II, 2. — *C. grandiflorum* α *rosmarinifolium* Fenzl in Ldb. Fl. Ross. I (1842) 414. — *C. grandiflorum* Boiss. Fl. Or. I, 727, ex parte; Som. et Lev. in A. H. P. XVI, 86, non Waldst. et Kit. — *C. argenteum* β *minor* Freyn et Conrath in Bull. Herb. Boiss. III (1891) 100. — Exs.: HFR no. 1257; Pl. or. exs. no. 62.

Perennial, forming large dense mats; stems numerous, densely leafy, 10–30 cm long, rarely 4–7 cm (var. *minor* Freyn et Conrath); leaves linear, with revolute margins, spreading or recurved, the lower usually greatly exceeding internodes, 1–3.5 cm long and 1–3 mm broad, with a prominent midrib; bract and sepals oblong, broadly scarious-margined, the latter 5–9 mm long; petals lobed to one-third, 2–2.5 times as long as calyx; capsule oblong, with flat erect or somewhat divergent teeth. June–July. (Plate XXIV, Figure 5).

Rocks and stony slopes. — Caucasus: E. Transc. Endemic. Described from Tiflis [Tbilisi]. Type in Leningrad.

46. *C. sosnowskyi* B. Schischk. nom. nov. — *C. argenteum* ssp. *glabratum* Sosnowsky in Mon. Jard. Bot. Tiflis. Nov. sér., livr. I (1922–23) 73. — *C. grandiflorum* var. *glabra* Trautv. in A. H. P. IV (1876) 358.

465 Perennial, forming loose tufts; stems numerous, ascending at base, 10–20 cm long, more or less covered with crisp hairs or almost glabrous, simple or in the inflorescence branched; leaves linear, 1–3 cm long and 0.7–2 mm broad, acute, the upper more distant than the lower, glabrous or slightly pubescent, the margins flat or more rarely revolute; flowers in loose cymes at end of stem; bracts ovate, broadly scarious-margined or scarious throughout, 2.5–4 mm long, acute; pedicels 1–3.5 cm long, commonly covered with soft crisp hairs; sepals ovate, 5.5–7 mm long, broadly scarious-margined, obtuse, with soft appressed hairs on the back or glabrate; petals white, 2–2.5 times as long as calyx, lobed to one-third; petal-claws and filaments glabrous; capsule twice as long as calyx, the teeth erect, slightly revolute or almost flat; seeds reniform, bluntly tuberculate. July–August.

Rocks. — Caucasus: E. part of W. Transc. (Borzhomi, Abastuman, Tskhra-Tsnara, Azhar-Imeretian Range). **Gen. distr.:** Arm.-Kurd. (Ardagan). Described from Abas-Tuman. Type in Tiflis.

47. *C. szowitsii* Boiss. Fl. Or. I (1867) 717; Voron. in Fom. and Voron., Oprod. rast. Kavk. II, 2, 162. — *C. araraticum* Rupr. Fl. cauc. (1869) 234; Voron. in Fom. and Voron., Oprod. rast. Kavk. II, 2, 169.

Perennial, white-tomentose, except in lower part, by implexed hairs; stems erect, 10–20 cm long, brittle, matted together with reduced sterile shoots; leaves lanceolate to linear-lanceolate, 10–25 mm long and 2–3.5 (5) mm broad, acute; flowers 1–4 at end of stem; pedicels erect, longer than calyx; bracts broadly scarious-margined, acute; sepals lanceolate, 7–8 mm long and 2 mm broad, white-woolly on the back, broadly scarious-margined; petals white, twice as long as calyx, lobed to one-third; capsule oblong, about twice as long as calyx, dehiscent by erect, revolute-margined teeth; seeds ca. 1 mm long, bluntly tuberculate. June–August.

Alpine and subalpine rocks, at altitudes of 2,000—3,300 m. — Caucasus: E. and S. Transc. Gen. distr.: Arm.-Kurd. Described from Mt. Kiyas. Type in Geneva.

48. *C. dagestanicum* Schischk. in Addenda V, p. 883 (1936).

Perennial, white-tomentose throughout; stems ascending at base, 7—15 cm long, brittle; leaves lance-ovate, 1—2.5 cm long and 4—6 mm broad, subacute; flowers 3—8 on the stem; pedicels shorter to longer than calyx; sepals lanceolate, 6—9 mm long, acute, woolly on the back, scarious-margined; petals twice as long as calyx, cleft to the middle, with ovate lobes; petal-claws and filaments glabrate; capsule slightly exceeding to 1.5 times as long as calyx, with reflexed teeth; seeds sharply tuberculate. June—July.

Stony and grassy slopes and rock crevices at altitudes of 1,200—2,500 m. — Caucasus: Dag. and E. part of Main Range. Endemic. Described from Dagestan. Type in Leningrad.

49. *C. ponticum* Alb. in Bull. Herb. Boiss. II (1894) 449; Prodr. Fl. colch. 37; Voron. in Fom. and Voron., Oprod. rast. Kavk. II, 2, 168.

166 Perennial, heavily white-fleecy; stems numerous, 10—20 cm long, brittle, simple; lower leaves lance-linear, often falcate; median cauline elliptic or oblong-lanceolate, 2—3 cm long and 6—10 mm broad; flowers 7—15 at end of stem; pedicels 5—15 mm long; bracts almost wholly scarious; sepals lanceolate, 5—7 mm long and 1.5—2 mm broad, acute, broadly scarious-margined; petals white, 2—3 times as long as calyx, lobed to one-fourth; petal-claws and filaments glabrous; capsule 1.5 times as long as calyx, with erect teeth; seeds reniform, ca. 1.5 mm long, bluntly tuberculate. August—September. (Plate XXIV, Figure 6).

Calcareous rocks in the alpine zone, at altitudes of 1,900—2,400 m. Caucasus: W. part of the Main Range. Endemic. Described from Abkhazia (Bzybskii Range, Mt. Mamdzykhka). Type in Geneva.

50. *C. stevenii* Schischk. nom. nov. — *C. villosum* Stev. in Bull. Soc. Nat. Mosc. XXIX (1856) 332, non Baumg. (1816). — *C. glomeratum* b. *villosum* Shmal'g., Fl. I (1895) 162, ex parte; Gürcke in Richter-Gürcke, Pl. Eur. II (1899) 229; Voron. in Fom. and Voron., Oprod. rast. Kavk. i Kryma II, 2, 166.

Perennial, subtomentose throughout with soft partly spreading hairs; stems several, 10—15 cm long, erect, branched at summit; leaves obovate-oblong, somewhat tapering at base, 5—7.5 mm long and 2.5—4 mm broad, scarcely acuminate; inflorescence 5—7-flowered; pedicels 5—7 mm long; sepals white scarious at margins and at tips, acute, 3.5 mm long; petals white, 2-lobed, barely shorter than calyx; capsule slightly exceeding calyx. June.

Note. This species was collected on a single occasion near the village of Otuz and was described by Steven. In some characters, notably the indument, it resembles *C. biebersteinii* DC.; in others, such as the small flowers and short petals, it comes close to *C. caespitosum* Gilib. It is suspected that this plant may be a hybrid between the species indicated.

Genus 465. **HOLOSTEUM** * L.**

L. Gen. I (1737) 376.

Sepals 5, lanceolate, scarious-margined; petals 5, white or pale pink, entire or jagged-denticulate; stamens 3—10; styles commonly 3; capsule cylindric, dehiscing by 6 revolute teeth; seeds concavo-convex, longitudinally furrowed on the convex and keeled on the concave side. Annual plants with slender roots and 1 to several erect stems; flowers in an umbellate terminal inflorescence. Russian: kostenets [from kost', bone].

1. Plants more or less glandular-pubescent; pedicels recurved after anthesis, again erect in fruit; bracts not more than 2 mm long 2.
- + Plants glabrous; pedicels erect; bracts to 5 mm long, scarious-margined 3. *H. marginatum* C. A. M.
2. Stamens 3—5; bracts and lower part of pedicels glabrous; petals equaling or slightly longer than calyx 1. *H. umbellatum* L.
- + Stamens 10; bracts and lower part of pedicels glandular-pubescent; petals about 1.5—2 times as long as calyx 2. *H. glutinosum* (M. B.) Fisch. et Mey.

1. *H. umbellatum* L. Sp. pl. I (1753) 88; Shmal'g., Fl. I, 155; Kryl., Fl. Zap. Sib. V, 1017. — *H. umbellatum* α *oligandrum* Fenzl in Ldb. Fl. Ross. I (1842) 373. — Ic.: Fl. Yugo-Vost. IV, 259.

Annual, green or sometimes glaucescent, 3—25 cm high; upper part of stems, pedicels, calyx, and leaf margins glandular-pubescent; bracts 1—2 mm long, scarious, glabrous as are the joints of pedicels, or (in var. *glabrum* Schur.) the whole plant glabrous; cauline leaves 2 pairs, oblong, narrowly lanceolate or more rarely subovate, acute; radical leaves rosulate, oblong-obovate, tapering to a petiole; pedicels up to 10, unequal, recurved after anthesis, re-erecting in maturity; flowers half-open or cleistogamous; sepals 3—4.5 mm long, 1.5—2 mm broad, glabrous or glandular-pubescent; petals white, sometimes pinkish, oblong-elliptic, jagged-denticulate at apex, as long as or slightly longer than calyx; stamens 3—5; mature capsule 1.5 times as long as calyx. March—May. (Plate XXV, Figure 2).

Steppe solonetztes, sands, more rarely river pebbles, and occasionally cultivated land. — European part: U. Dnp. (S.), V.-Don (S.), Transv. (S.), Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., W., E., and S. Transc., Tal.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Mtn. Turkm., Syr D., Amu D., T. Sh. **Gen. distr.:** Scand. (S.), Centr. Eur., Atl. Eur., W. and E. Med., Bal.-As. Min., Iran., Ind.-Him., Dzu.-Kash. Described from Germany and France. Type in London.

Economic importance. Sometimes infesting field crops but not considered a troublesome weed.

2. *H. glutinosum* (M. B.) Fisch. et Mey. Ind. sem. Hort. Petrop. VI (1839) 52. — *Arenaria glutinosa* M. B. Fl. taur.-cauc. I (1808) 344. — *Holosteum liniflorum* Fisch. et Mey. Ind. sem. Hort. Petrop. III (1837) 39. —

* From Greek holos, mature [?], and osteon, bone, as the plant was apparently once used as a cure for bone fractures.

** Treatment by O. A. Murav'eva.



PLATE XXV. 1. *Holosteum marginatum* C. A. M., capsule, bracts. — 2. *H. umbellatum* L., capsule, part of flower, bracts. — 3. *H. glutinosum* (M. B.) Fisch. et Mey., part of flower, capsule, bracts. — 4. *Sagina nivalis* (Lindbl.) Fries., portion of plant, flower, seed, leaf, capsule, ovary. — 5. *S. oxysepala* Boiss., capsule, seed and its fragment. — 6. *S. apetal a* Arduino, capsule, seed, leaf. — 7. *S. litoralis* Hultén, flower, sepal, seed. — 8. *S. maxima* A. Gray, seed and its fragment.

H. liniflorum Stev. ex Fisch. et Mey. Ind. sem. Hort. Petrop. IV (1838) 10; Fenzl in Ldb. Fl. Ross. I, 374; Boiss. Fl. Or. I, 710. — *H. polygamum* C. Koch in Linnaea XV (1841) 708. — *H. umbellatum* β *pleiandrum* Fenzl in Ldb. Fl. Ross. I (1842) 374, 781; Boiss. Fl. Or. I, 710. — *H. imberbe* subsp. *macropetalum* J. Gay in Ann. Sc. nat. 3 ser. IV (1845) 37. — *H. umbellatum* β *glandulosum* Vis. Stirp. Dalm. (1826) 37; Shmal'g., Fl. I, 156. — *H. umbellatum* var. *glutinosum* Gürke in Richt.-Gürke Pl. Eur. II (1899) 236. — *Cerastium minutum* Kom. in Trav. Soc. Nat. Pétersb. XXVI (1896) 139.

Annual, green, 4–30 cm high, covered in all parts with glandular hairs; bracts very small, 2–3 mm long, foliaceous, glandular-pubescent as are pedicel joints; cauline leaves 2 or 3 pairs, to 2.5 cm long, oblong or lanceolate to sublinear; radical leaves smaller, tapering to a petiole; pedicels unequal, recurved after anthesis, re-erecting in maturity; flowers larger than those of the preceding species; sepals to 5 mm long; petals pale pink or white, entire or slightly jagged-denticulate, 1.5–2 times as long as calyx; stamens 10; mature capsule about twice as long as calyx. March–May. (Plate XXV, Figure 3).

Steppes, sands and loams, stony mountain slopes, and limestone. — European part: Transv. (S. part), L. V.; Caucasus: Cisc., W., E., and S. Transc.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kyz. K., Kara K., Mtn. Turkm., Amu D., Syr D., Pam.-Al., T. Sh. **Gen. distr.:** As. Min., Arm.-Kurd., Iran. Described from steppes between Astrakhan and Kizlyar. Type in Leningrad.

3. *H. marginatum* C. A. M. in Hohenack. Enumer. pl. Talysch. (1838) 166; Fenzl in Ldb. Fl. Ross. I, 374. — Ic.: Grossg., Sosn. and Shishk., Fl. Tifl. I, fig. 80.

Annual, glaucescent, quite glabrous, 4–30 cm high; bracts large, to 5 mm long, scarious-margined, elliptic or oval or ovate; cauline leaves 1 or 2 pairs, elongate-elliptic to narrowly lanceolate, connate at base; radical leaves rosulate, obovate or oval, tapering to a rather long petiole; pedicels always erect; sepals to 5 mm long, scarious-margined; petals white or pinkish, entire, equaling to 1.5 times as long as calyx; stamens 10; mature capsule about equaling calyx or exceeding it by not more than one-third. March–May. (Plate XXV, Figure 1).

Dry hills and stony slopes, rarely meadows and fields. — Caucasus: Cisc., Dag., W., E., and S. Transc., Tal. **Gen. distr.:** Iran. Described from Talysch. Type in Leningrad.

Genus 466. **SAGINA** * L.**

L. Sp. pl. (1753) 128.

Sepals 4 or 5; petals as many, entire or notched, often persistent in fruit, or wanting; stamens 4–10; styles 4 or 5; capsule dehiscent to base into 4 or 5 valves; seeds reniform. Annuals or perennials, mostly caespitose; flowers small, 2–3 mm long, long-pedicel; leaves linear, connate at base. Russian name: mshanka.

* *Sagina*, forage, as *Spergula arvensis*, cultivated as a forage plant, was named by de l'Obel *Sagina spergula*.

** Treatment by E. I. Shteinberg.

1. Sepals and petals 5 2.
- + Sepals and petals 4 5.
2. Stem terminated by a large white flower; petals twice as long as calyx; cauline leaves with reduced shoots [fascicles] in the axils 1. *S. nodosa* (L.) Fenzl.
- + Stems not terminated by a large flower 3.
3. Pedicels and sepals glabrous; stems densely tufted; flowers very small; petals somewhat shorter than calyx 2. *S. saginoides* (L.) Dalla Torre.
- + Pedicels and sepals glandular-pubescent 4.
4. Seeds covered with short flat papillae 4. *S. litoralis* Hultén.
- + Seeds covered with cylindric papillae (under the microscope) 3. *S. maxima* A. Gray.
5. Sepals acute, lanceolate, slightly exceeding the capsule and appressed to it; petals none 8. *S. oxysepala* Boiss.
- + All sepals obtuse or two of them hooded 6.
6. Sepals appressed to capsule; stems not rooting, mostly simple; petals somewhat shorter than calyx. Small Arctic plants 7. *S. nivalis* (Lindbl.) Fries.
- + Fruiting sepals spreading 7.
7. Stems rooting; pedicels recurved at summit after flowering; sepals broad-ovate, all equal; petals often persistent in fruit; leaves glabrous 5. *S. procumbens* L.
- 472 + Stems always erect; pedicels not recurved at summit; sepals unequal, the outer two hooded at apex; petals minute, promptly caducous; leaves ciliate in lower part 6. *S. apetala* Arduino.

Section 1. *SPERGELLA* Rchb. in Moessler Handb. 2. Aufl. I (1827) S. LXV. — Flowers nearly always 5-merous; stamens 8–10, rarely 5; capsule dehiscent by 5 teeth; petals twice as long as or somewhat shorter than sepals.

1. *S. nodosa* (L.) Fenzl, Verbr. Alsin. (1833) tab. ad p. 18; Ldb. Fl. Ross. I, 340; Kryl., Fl. Zap. Sib. V, 1017; Shmal'g., Fl. I, 149. — *Spergula nodosa* L. Sp. pl. (1753) 440. — Ic.: Syreishch., Ill. Fl. Mosk. gub., 116; Hegi Ill. Fl. Mittel-Eur. III (1909) 382, t. 106; Fl. Yugo-Vost., fig. 303; Maevsk., Fl. Sr. Ross., fig. 118. — Exs.: Herb. Fl. Ingr., 121 sub. *Spergella nodosa* Fenzl; Fl. pol. exs. no. 322; HFR no. 160; Pl. Finl. exs. no. 624? var. *glandulosa* (Bess.).

Perennial, to 25 cm high; stems several, erect or sprawling, branched, glabrous or sparsely covered with glandular hairs, more densely so at base of calyx (var. *glandulosa* (Bess.)); leaves glabrous or sparsely glandular-ciliate, the radical rosulate, linear, mucronate, to 30 mm long and to 0.75 mm broad, the cauline progressively shorter toward summit where ca. 1 mm long, with axillary branchlets reduced to leaf fascicles; internodes numerous; flowers 1 or 2 at ends of stems and branches, on rather short pedicels; sepals 5, broadly lanceolate, obtuse, membranous-margined, glabrous or with glandular hairs mainly at base, 1.75–2.5 mm long and 1.25–1.5 mm broad, half as long as petals; petals 5, white,

broad-ovate, obtuse, to 5 mm long and ca. 2.5 mm broad, abruptly narrowing to a short claw; stamens 10; styles 5; capsule oblong, twice as long as calyx, dehiscent by 5 valves. June—August.

Wet sandy places, sandy soil in pinewoods, field borders, and roadsides. — Arctic: Arc. Eur. (rarely); European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm.; U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don; Caucasus: (apparently introduced); Dag. and Gr. Cauc. (Mt. Kazbek); W. Siberia: Ob; E. Siberia: Yenisei, Lena-Kol., Ang.-Say. Gen. distr.: northern and central parts of W. Eur., N. Am., Greenland. Described from W. Europe. Type in London.

2. *S. saginoides* (L.) Dalla Torre, Anl. Beobacht. Alpenpfl. (1882) 189. — *Spergula saginoides* L. Sp. pl. (1753) 441. — *S. micrantha* Bge. in Ldb. Fl. Alt. II (1830) 183. — *S. semidecandra* Turcz. ex Ldb. Fl. Ross. I (1842) 339, nom. nud. — *Sagina linnaei* Presl, Rel. Haenk. II (1831) 14; Fenzl in Ldb. Fl. Ross. I, 339; Kom. and Alis., Opr. rast. Dal'nevost. kr. I, 495; Kryl., Fl. Zap. Sib. V, 1018. — *Arenaria frigida* Rupr. Fl. Cauc. (1869) 202. — *S. arctica* Scheutz, Plant. Jeniss. in Kongl. Sv. Vet.-akad. Handl. 22, no. 10 (1887) 93. — Ic.: Hegi, Ill. Fl. Mittel-Eur. III (1909) 382, t. 106; Lindmann. Svensk Fanerogamenflora (1918) 233. — Exs.: Fellman, Pl. arct. 40; Haglund in Källström, Herbarium Skandinavicum, sub *Sagina saxatili*.

Perennial, to 6 cm high, glabrous; stems numerous, ascending, forming a mat; leaves narrowly linear to subulate, acute, to 18 mm long and to 1 mm broad; pedicels 15—20 mm long; sepals 5, ovate, obtuse, to 2 mm long and to 1.5 mm broad; petals 5, as long as or much shorter than sepals or wanting; stamens often 5 (var. *micrantha* (Bge.) Fenzl) or else 10 (var. *decandra* Fenzl); styles 5; capsule about twice as long as calyx, dehiscent by 5 valves. May—August.

Rocks, stony slopes, rock streams, river pebbles and shallows in the alpine and polar-arctic regions and adjoining parts of the forest belt. — Arctic: Arc. Eur. and Sib., Chuk.; European part: Kar.-Lap., Dv.-Pech., V.-Kama; Caucasus: Cisc., Dag., W. and E. Transc.; W. Siberia: Ob, Irt., Alt.; E. Siberia: Yenisei, Lena-Kol., Ang.-Say.; Far East: Kamch.; Centr. Asia: Dzu.-Tarb., Pam.-Al., T. Sh. Gen. distr.: Scand., Centr. and Atl. Eur., Med., Bal.-As. Min., Him., Dzu.-Kash., Ber., N. Am. Described from France and Siberia. Type in London.

3. *S. maxima* A. Gray in Mem. of the Amer. Acad. of Arts and Sci. N. S. 6 (1857) 382 in annot. — *S. linnaei* var. *maxima* Maxim. Mém. Biol. IX. (1873) 33. — *S. sinensis* Hance in Journ. Bot. (1863) 46. — Ic.: Somokou Zoussetz, vol. 8, fol. 32, sub *Tsoume Koussa* (Icon. mala.).

Annual?, to 15 cm high; stems profuse, ascending and loosely caespitose or erect; leaves to 20 mm long and 1 mm broad, narrowly linear, apiculate; pedicels glandular-hairy, to 1.5 cm long, 1-flowered; flowers 4- or 5-merous; sepals ovate, acuminate, to 2 mm long and to 1.5 mm broad; petals scarcely shorter than calyx, ovate, short-clawed; capsule exerted to one-fourth from the loosely adhering calyx; seeds papillose, the papillae cylindric (under the microscope). March—September. (Plate XXV, Figure 8).

Seaside sands and shallows. — Arctic: An.; Far East: Uss., Sakh.
Gen. distr.: Japan, Manchuria, Korea, Formosa, China. Described from Japan. Type in Leningrad.

Note. This species is very similar in habit to *S. litoralis* Hultén from which it is distinguishable mainly by the seeds.

4. *S. litoralis* Hultén, Fl. Kamtch. II (1928) 78; Kom., Fl. Kamch. II (1929) 102. — *S. maxima* A. Gray, Botany Japon. 382 (pro parte). — Ic.: Hultén, Fl. Kamtch. II, tab. 2, fig. d.

474 Perennial, tufted-branched from base, the branches scarcely rooting, 5–10 cm long; leaves smooth, the radical filiform, ca. 15 mm long, the cauline linear-filiform to subulate, 4–6 mm long, the upper often sparsely glandular-pubescent; pedicels solitary, 15–20 mm long, glandular, often nodding at summit; sepals 5, oval-elliptic, glandular, membranous-margined, 2–2.5 mm long and 1–1.5 mm broad; petals white, somewhat shorter than calyx, 1–1.5 mm long and 0.75–1 mm broad; capsule acute, exceeding perianth; seeds 0.6 mm long, covered with short round papillae. July–September. (Plate XXV, Figure 7).

Seashores, most probably from Kamchatka to Korea. — Far East: Kamch., Uss., Sakh. **Gen. distr.:** Far East. Described from Kamchatka. Type in Stockholm.

Section 2. *SAGINELLA* Koch, Syn. ed. 2 (1843) 117. — Flowers 4- or rarely 5-merous; capsule dehiscing by 4 teeth; petals up to half as long as sepals, often obsolescent or promptly caducous.

5. *S. procumbens* L. Sp. pl. (1753) 128; Shmal'g., Fl. I, 149; Kryl., Fl. Zap. Sib. 1018. — *Arenaria procumbens* Rupr. Fl. Cauc. (1869) 202. — Ic.: Fl. dan. XII (1834) t. 2103; Syreishch., Ill. Fl. Mosk. gub. II, 116; Hegi Ill. Mittel-Eur. III (1909), 382, t. 106, 388; Rechb. Ic. Fl. Germ. V (1841), t. 201; Fedchenko and Flerov, Fl. Evr. Ross., fig. 278. — Exs.: HFR no. 1158; Pl. Finl. exs., no. 621; Fl. exs. Reip. Bohem. Sloven., no. 312; Fl. Bohem. et Morav. exs., no. 151; Call. Fl. Siles. exs., no. 1032. Vernacular name: mokrets.

Perennial, glabrous or rarely leaves glandular-ciliate on the margin and at base; stems ascending or procumbent, branched, rooting, 2–9 cm long; leaves narrowly linear, acuminate and bristle-tipped, slightly connate at base, 2–10 mm long and 0.25–0.5 mm broad; pedicels 10–20 mm long, recurved after anthesis and re-erecting in fruit; sepals 4, rarely 5, obtuse, ovate, to 2.25 mm long and to 1.75 mm broad, reflexed in fruit; petals 4, rarely 5, white, one-fourth to one-third as long as calyx; stamens 4; styles 4; capsule ovoid, 1.5–2 times as long as calyx, dehiscing by 4 valves. May–September.

Water meadows, glades, pastures, and untended roadsides. — Arctic: Arc. Eur.; Eur. part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim. (rarely); Caucasus: Cisc., Dag., W., E., and S. Transc.; W. Siberia: Ob, U. Tob., Irt., Ang.-Say. (introduced?). **Gen. distr.:** Scand., Centr. and Atl. Eur., W. Med., Bal., Ind.-Him., N. Am., Tib. Described from W. Europe. Type in London.

475 6. *S. apetala* Arduino, Animadv. bot. spec. (1759) 22; Shmal'g., Fl. I, 149; Grossg., Fl. Kavk. II, 388. — Ic.: Arduino, l. c., tab. 8, fig. 1.

Annual, to 10 cm high; stems numerous, mostly erect, sometimes ascending, minutely glandular-pubescent; branches always erect; stems minutely glandular-pubescent; leaves aristate, ciliate at base; pedicels always erect (in marked contrast to *Sagina procumbens*); sepals to 2 mm long, obtuse, divergent in fruit, the outer 2 mucronate; petals 4, small, white, or wanting; stamens 4, facing sepals; styles 4; capsule dehiscing by 4 valves, equaling to 1.5 times as long as calyx. May—September. (Plate XXV, Figure 6).

Fields and meadows; rare. — European part: Bl., V.-Kama; Caucasus: W. Transc., Cisc. **Gen. distr.:** Eur., W. Asia, N. Am., Canary Islands. Described from Italy.

7. *S. nivalis* (Lindbl.) Fries, Novit. Fl. suec. Mant. III (1842) 31; Fedch. and Fler., Fl. Evrop. Ross. II 380. — *Spergula nivalis* Lindbl. in Phys. Sällsk. Tidsk. (1837—38) 128. — *Sagina intermedia* Fenzl in Ldb. Fl. Ross. I (1842) 339. — Ic.: Fl. Dan. XVII (1880) t. 2961; Lindm. Svensk Fanerogamenflora (1918) 242. — Exs.: Baenitz, Herbar. Europ. (sub *Sagina nivalis* Fries).

Annual?, glabrous, to 20 or rarely to 30 mm high, tufted; stems simple, bearing 1 or 2 flowers; leaves linear-subulate, fleshy, acute or pungent, the radical to 10 mm long and to 1 mm broad, the cauline smaller; pedicels to 10 mm long, rarely longer; sepals 4 or 5, ovate, obtuse, to 1.5 mm long and to 1 mm broad, often reddish at tips; petals 5, white, ovate from a broad base, to 2 mm long and to 1.5 mm broad, equaling or slightly exceeding sepals; stamens 8—10; stigmas 4 or 5; capsule dehiscing by 4 or 5 valves. July—September. (Plate XXV, Figure 4).

Riverbanks and lakeshores, pebbles, and bluffs. — Arctic: Arc. Eur., Nov. Z., Arc. Sib., Chuk. **Gen. distr.:** Arc., Scand. Described from Norway. Type in Stockholm.

8. *S. oxysepala* Boiss. Fl. Or. I (1867) 663; Grossg., Fl. Kavk. II, 387.

Annual, tufted; stems erect, 5—10 cm long; leaves subulate-acuminate, glabrous; pedicels erect, glabrous or glandular-pubescent; sepals 4, lanceolate, acute; fruiting sepals appressed to and scarcely exceeding capsule; petals none. June—July. (Plate XXV, Figure 5).

Damp places. — Caucasus: W. and S. Transc. Endemic. Described from Armenia. Type in Leningrad.

Genus 467. **BUFFONIA*** L.

476 Sepals 4; petals 4, white, entire; stamens 4 or 8, inserted on a perigynous disk, this sometimes glandular; styles 2; ovary 2- or 4-ovuled; capsule unilocular, 2-seeded, dehiscing to base by 2 valves. Annuals or undershrubs with opposite subulate leaves appressed to the stem.

* Named for the French scientist George Louis Leclerc, Comte de Buffon (1707—1788). According to another version, from Latin *bu fa*, frog, on account of resemblance of some plants of this genus to *Juncus bufonius* L.

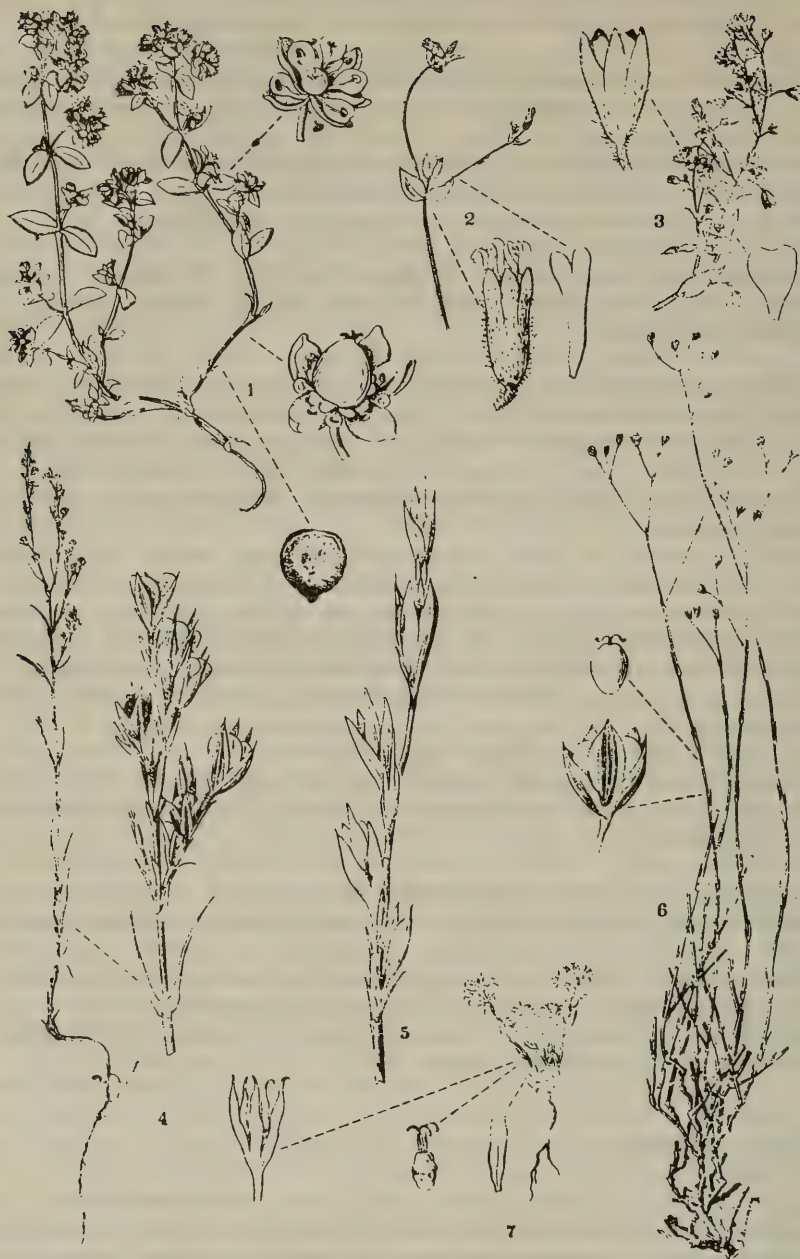


PLATE XXVI. 1. *Ammodenia peploides* (L.) Rupr., pistillate flower, staminate flower, seed.— 2. *Lepyrodiclis stellarioides* Schrenk., flower, fruit.— 3. *L. holosteoides* (C.A.M.) Fenzl, flower, fruit.— 4. *Buffonia parviflora* Griseb.— 5. *B. oliveriana* Ser.— 6. *B. macrocarpa* Seringe, flower, ovary, staminode. [Item 7 missing in Russian original.]

1. Undershrub; branches puberulent in lower part; pedicels filiform; glabrous, 2 – 30 mm long, divergent; ovary containing 4 ovules 1. *B. macrocarpa* Ser.
- + Annuals or biennials; stem glabrous; pedicels appressed; ovary containing 2 ovules 2.
2. Stamens 4; calyx ca. 4 mm long 3. *B. oliveriana* Ser.
- + Stamens 3 or 4; calyx ca. 3 mm long 2. *B. parviflora* Griseb.

1. *B. macrocarpa* Ser. in DC. Prodr. I (1824) 388; Boiss. Fl. Or. I, 667. – *B. sintenisii* Freyn in Bull. Herb. Boiss. Sér. II, III (1903) 1054.

Undershrub, 30 – 40 cm high, profusely branched at base; stems numerous, erect, branched at summit, herbaceous, puberulent in lower part, glabrous above; leaves subulate, the lower ca. 1 cm long, puberulent, the upper shorter, glabrous; bracts small, ovate, broadly scarious-margined, acute; pedicels filiform, 2 – 30 mm long, glabrous; sepals ovate, ca. 3 mm long, 3 – 7-nerved, acutish, scarious-margined; petals ovate, as long as or scarcely longer than calyx; stamens 8; ovary 4-ovuled; styles slightly longer than ovary; capsule equaling or exceeding calyx; seeds ca. 2 mm long, subrotund, finely rugulose. June – July. (Plate XXVI, Figure 6).

Stony and sandy-stony slopes. – Centr. Asia: Mtn. Turkm. (Kopet Dag: Sulyuklyu, Kheirabad). **Gen. distr.:** Iran. Described from Iran (between Teheran and Isfahan). Type in Geneva.

2. *B. parviflora* Griseb. Spicil. Fl. Rum. Bith. I (1843) 197. – *B. tenuifolia* M. B. Fl. taur.-cauc. I, 115; Boiss. Fl. Or. I, 665; Shmal'g., Fl. I, 150; Fom. and Voron., Opred. rast. Kavk. II, 2, 173; Grossg., Fl. Kavk. II, 388, non L. – *B. tenuifolia* γ *intermedia* Fenzl in Ldb. Fl. Ross. I (1842) 341. – *B. macrosperma* Boiss. Fl. Or. I, 664, ex parte, non J. Gay. – *B. virgata* Syreishch. in Izv. Gl. Bot. Sada XXVIII (1929) 527, non Boiss.

479

Annual or biennial; stems simple or branched from base; branches ascending or spreading, 10 – 40 cm long, glabrous or sometimes in lower part scabrous-puberulent; leaves narrowly linear to subfiliform, with revolute margins, 3-veined, hirsute-ciliolate on the margin, at the somewhat dilated base 1.5 – 2 mm broad and scarious-margined; pedicels densely puberulent in upper part, shorter to slightly longer than calyx; sepals lanceolate, ca. 3 mm long, acute, 3-nerved, scarious-margined; petals one-third as long as calyx; stamens 3 or 4; capsule 2.0 – 2.5 mm long; seeds oblong, 1 – 2 mm long, sharply tuberculate on the back, the faces smooth or faintly tuberculate. June – July. (Plate XXVI, Figure 4).

Stony slopes, bluffs, oak-and-juniper woods, and sandy-pebbly seashores. – European part: Bl., Crim.; Caucasus: E. and S. Transc., Tal. **Gen. distr.:** Bal.-As. Min. Described from S. Macedonia. Type in Vienna.

Note. Fenzl (l. c.) referred the Crimean plant to *B. tenuifolia* as var. *intermedia* Fenzl. He noted in his description the morphological features which this plant shares with *B. tenuifolia* L. on one hand, and with *B. macrosperma* J. Gay on the other. Boissier (l. c.) reported for the Crimea two species, *B. tenuifolia* L. and *B. macrosperma*

J. Gay. Boissier's lead was taken up by various later authorities. A third species, *B. virgata* Boiss. was reported more recently by D. I. Syreishchikov (l. c.). Having studied the vast material which has accumulated for the Crimea and the Caucasus, we have arrived at the conclusion that only one species of *Buffonia* grows in these areas and its rightful name is *B. parviflora* Griseb.

3. *B. oliveriana* Ser. in DC. Prodr. I (1824) 388; Boiss. Fl. Or. I, 665.

Annual; stem 15–50 cm long, glabrous, commonly branched from base; branches ascending, about as long as the main stem; more rarely stem simple; leaves linear-subulate, 1.5–3 cm long and 0.25–0.5 mm broad, connate in pairs at the dilated base, 3-veined, acute, the margins ciliate; flowers in a slender paniculate or racemiform inflorescence; pedicels ca. 2 mm long, glabrous at the very base, densely pubescent above; bracts lanceolate, acute, glabrous, scarious-margined, ca. 2.5 mm long; sepals lanceolate, 3.5–4 mm long, acuminate, 3-nerved, glabrous; petals linear, three-fourths as long as calyx; stamens 8; half as long as calyx; styles very short; ovary 2-ovuled; capsule 2-seeded, ca. 2.5 mm long; seeds oblong, ca. 2 mm long, sharply tuberculate on the back, with almost smooth faces. June–July. (Plate XXVI, Figure 5).

Stony slopes. – Centr. Asia: Mtn. Turkm. (Kopet Dag, Kugitang).

Gen. distr.: Arm.-Kurd., Iran. Described from Iran (Teheran). Type in Geneva.

480

Genus 468. **LEPYRODICLIS** * FENZL**

Fenzl in Endlicher, Gen. (1840) 966.

Flowers small, mostly numerous, in a divaricately paniculate inflorescence; sepals 5, rarely 6 or 7; petals 5; stamens 10 or more, rarely 12–14; styles 2 or 3; capsule globose, dehiscing by 2 or 3 valves, 1- or 2-seeded. Annual herbs, branched to varying extent; leaves linear-lanceolate or lanceolate, flat, veinless except for midrib, opposite, exstipulate. Russian name: pashennik.

1. Stems to 100 cm long, mostly profusely branched; inflorescence many-flowered; pedicels rather long; calyx campanulate or conical at anthesis, sparsely glandular-pilose; petals white or pink, slightly notched, broadly obovate. . . 1. *L. holosteoides* (C. A. M.) Fisch. et Mey.
- + Stems to 55 cm long, sparingly branched; inflorescence few-flowered; pedicels rather short; calyx cylindric at anthesis, glandular-pilose; petals pink, deeply notched, narrowly linear 2. *L. stellarioides* Schrenk.

1. *L. holosteoides* (C. A. M.) Fisch. et Mey. in Schrenk, Enum. pl. nov. I (1841) 93; Fenzl in Ldb. Fl. Ross. I (1842) 359; Boiss. Fl. Or. I, 668; Opr. r. okr. Tashkent II, 105; Grossg., Fl. Kavk. II, 388. – *Gouffea holosteoides* C. A. M. Verz. Pfl. Cauc. (1831) 217. – *Arenaria holosteoides* Edgew. in Hook. Fl. br. Ind. I (1874) 241. – Exs.: HFR no. 1408; H. F. A. M. no. 459.

* From Greek *lepyron*, skin, and *diclis*, double valves.

** Treatment by S. G. Gorshkova.

Annual; stems slender, weak, decumbent or ascending, to 40–100 cm long; leaves lanceolate, more or less tapering toward base, sessile, 5 mm to 8 cm long, 3 mm to 1 cm broad, acute, the margin glandular-pubescent or cartilaginously glandular-dentate; inflorescence many-flowered, divaricately paniculate; pedicels elongated, often longer than calyx; calyx campanulate or conical at anthesis, sparsely glandular-pilose, 3–5 mm long and 1 mm broad; sepals lanceolate, acutish, very narrowly scarious-margined; petals white or pink, broadly obovate, slightly notched at apex, 1.5 times as long as calyx; seeds globose, brown, finely tuberculate. April – August.

Low foothills and plains, commonly among crops, banks of streams, surroundings of villages, wasteland, and vegetable gardens. – Caucasus: E. and S. Transc., Tal.; Centr. Asia: Ar.-Casp., Mtn. Turkm., Syr D., Pam.-Al., T. Sh. **Gen. distr.:** Bal.-As. Min., Arm.-Kurd., Iran., Ind.-Him. Described from Talysh (near Limar, Zuvant) (500–700 m). Type in Leningrad.

481

2. *L. stellarioides* Schrenk in Fisch et Mey. Enum. pl. nov. Schrenk I (1841) 93; Fenzl in Ldb. Fl. Ross. I, 359; Boiss. Fl. Or. I, 669; Opr. rast. okr. Tashkenta II, 105; Grossg., Fl. Kavk. II, 105; Grossg., Fl. Kavk. II, 388. – *L. cerastioides*, Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 167. – *Arenaria holosteioides* var. *stellarioides* Williams in Journ. Linn. Soc. XXXIII (1898) 427. – Exs.: H. F. A. M. no. 460.

Annual, glabrous or sparsely pubescent; stems weak, ascending or decumbent, 9–55 cm long; leaves lanceolate, acute, tapering toward base, sessile, 1–4 cm long, 3–12 mm broad, the margin roughened with small cartilaginous teeth; inflorescence few-flowered, paniculate; pedicels not longer than calyx; calyx cylindric at anthesis, glandular-pilose, 3–10 mm long and 1.5–1 / ? / mm broad; sepals rather long, lanceolate or linear, acutish, narrowly white-margined; petals pink, narrowly linear, deeply notched, 1.5 times as long as calyx; seeds reniform-globular, brown, finely tuberculate. July.

Mountains, thickets of juniper and other shrubs, and pistachio groves. – Caucasus: S. Transc.; Centr. Asia: Balkh., Mtn. Turkm., Syr D., Pam.-Al., T. Sh. **Gen. distr.:** Iran. Described from Kuguldyr. Type in Leningrad.

Genus 469. **QUERIA*** LOEFL.

Loefl. Iter Hisp. (1752) 48. – *Querezia* L. Sp. pl. (1753) 89. – *Queria* L. Sp. pl. (1753) 90.

Sepals 5; petals very small, reduced to 5 short linear staminoides; stamens 10; styles 3; ovary containing 1 ovule; capsule 3-valved to the middle; seeds reniform-globular, somewhat compressed laterally. Annual plants reminiscent of the genus *Scleranthus* or *Minuartia sclerantha*.

1. *Q. hispanica* L. Sp. pl. (1753) 90 suppl.; Fenzl in Ldb. Fl. Ross. I, 341; Boiss. Fl. Or. I, 688; Shmal'g., Fl. I, 150. – *Querezia hispanica* L. Sp. pl. (1753) 89. – *Alsine hispanica* Fenzl, Verbr. Alsin. Tab. ad. p. 46 (1833). – *Scleranthus hamatus* Hausskn. in Mitt. d. Bot. Ver.

* Named for José Quer, professor at Madrid (1695–1764).

Thüring. IX (1890) 17. — *Minuartia hamata* Mattf. in Engl. Bot. Jahrb. LVII, Beibl. 126 (1921) 29. — Ic.: Willk. Ic. et Descr. Pl. Hispan. I, t. 66. — Exs.: Herb. Fl. Cauc. no. 172.

Annual; stem branched from base, 5–10 cm long, covered, like the leaves, with short crisp hairs; leaves linear-lanceolate, 0.5–1 cm long and 0.3–0.7 mm broad; flowers sessile, in compact capitate inflorescences subtended by stiff uncinat bracts; the lateral flowers of the dichasium consisting of a pair of sepals, sterile, the central ones fertile; the two outer sepals of fertile flowers bractlike, stiff, uncinat, prominently 3-nerved. May.

Stony slopes. — European part: Crim.; Caucasus: Cisc., Dag., E. and S. Transc.; Centr. Asia: Mtn. Turkm. **Gen. distr.:** Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from Spain. Type in London.

Note. The monotypic genus *Queria* is very closely related to the genus *Minuartia* L. (Alsine). Fenzl, in one of his early publications (1833), referred this plant to the genus *Alsine*, but in a later study (1841) separated this genus from *Alsine*. Among more recent authorities, Mattfeld (l. c.) again combined *Queria* with the genus *Minuartia*. In spite of the apparent resemblance to some *Minuartia* species, the genus *Queria* may be retained, in our opinion, for the following reasons: a single ovule is formed in the ovary and the 1-seeded capsule has a thin coriaceous wall which dehisces only to the middle by 3 valves; the fruit is shed together with bracteal elements.

Genus 470. **MINUARTIA** * L.

L. Sp. pl. (1753) 89; Hiern. Journ. of Bot. XXXVII (1899) 321. — *Alsine gaertn.* De Fruct. II (1791) 223; non L. — *Arenaria* L. Sp. pl. (1753) 423, ex parte. — *Sagina* Druce, Proc. Linn. Soc. (1907) 77, non L. — *Alsinopsis* Small. Fl. S. E. U. S. (1903) 419.

Sepals 5; petals 5, entire or very slightly notched; stamens 10; styles 3; ovary many-ovuled; capsule oblong or ovoid, dehiscing by 3 simple teeth; seeds numerous, reniform or /?/ compressed, unappendaged. Perennials or annuals with filiform, subulate, or linear leaves.

Note. The genus *Minuartia* L. is also known by the name *Alsine* which has found its way in the course of the last two decades into both the foreign and the Russian literature. A ruling of the Brussels International Congress of 1905 stipulated the retention of the name *Alsine* for this genus as nomen conservandum. Nevertheless, the name *Alsine* has not become established in the West European and American literature in view of the following considerations. Linnaeus, in his *Species plantarum* (1753), 272, referred two species to the genus *Alsine*, namely *Alsine media* and *A. segetalis*, these species being *Stellaria media* and *Delia (Alsine) segetalis*, respectively.

If Linnaeus be followed, *Alsine media* would have to be considered as the type of the genus and thus the name *Alsine* should be applied to all species of the genus *Stellaria* — a procedure that has indeed been adopted by the Americans. This, however, introduces a dilemma, considering

* Named for Minuart, professor at Madrid (1693–1768).

that Linnaeus (l. c., 421) also established the genus *Stellaria* and referred to it such species as *S. nemorum*, *S. dichotoma*, *S. radians*, *S. holostea*, and *S. graminea*. If, on the other hand, *A. segetalis* is accepted as typical of the genus, then one of the generic characters should be the presence of scarious stipules at the leaf base; this feature does not, however, occur in the genus *Alsine* as conceived by the early authorities.

Since type designation for the genus *Alsine* proves to be impracticable, attention has quite rightly been centered on the alternative appellation, *Minuartia*. This genus was also set up by Linnaeus and was made to include the species *M. dichotoma*, *M. campestris*, and *M. montana*. All these species fall under the concept of *Alsine*, more particularly in terms of the treatment which this genus received after publication of Wahlenberg's *Flora lapponica* (1812). In conformity with priority rules, however, the genus should be named *Minuartia* and not *Alsine*, the latter generic name being rightfully retained for *Alsine* (*Delia*) *segetalis*.

In view of these considerations, we adopt in the Flora of the USSR the name *Minuartia* to cover the full extent of the former genus *Alsine* Wahlb. We reserve the appellation *Alsine*, in compliance with Linnaeus, for *Alsine segetalis*, thus considering *Alsine* as a monotypic genus.

- 1. Sepals obtuse 2.
- + Sepals acute or mucronate 10.
- 2. Leaves long-ciliate; seeds disciform, with long-fringed margin . . 3.
- + Leaves without long cilia, glabrous or sometimes with minutely glandular or ciliolate margins; seeds not fimbriate-margined . . . 7.
- 3. Calyx glabrous; stems 10–20 cm long . . . 36. *M. laricina* (L.) Mattf.
- + Calyx pubescent; stems 2–10 cm long 4.
- 4. Leaves very small, 2–3 mm long, oval, obtuse, closely imbricate; sepals 3 mm long 42. *M. brotherana* (Trautv.) Woron.
- + Leaves linear or lanceolate, acute, 5–12 mm long; sepals 4–7 mm long 5.
- 5. Sepals and stems covered with simple hairs; sepals greenish 40. *M. imbricata* (M. B.) Woron.
- + Sepals and upper part of stems glandular-pilose; sepals often violet-tinged 6.
- 6. Seeds 2–2.5 mm in diameter; Arctic plants 39. *M. macrocarpa* (Pursh) Ostenf.
- + Seeds ca. 1 mm in diameter; plants of the Main Caucasus Range 41. *M. rhodocalyx* (Alb.) Woron.
- 7. Sepals 4–7 mm long; petals 1.5–2 times as long as calyx; radical leaves 1–3 cm long 8.
- + Sepals 3–4 mm long; petals equaling or scarcely exceeding calyx; leaves not more than 1 cm long 9.
- 8. Leaf margin ciliolate; radical leaves 2–3 cm long 37. *M. caucasica* (Ad.) Mattf.
- + Leaf margin glabrous; radical leaves 1–1.5 cm long 43. *M. arctica* (Stev.) Asch. et Gr.
- 9. Leaves obscurely veined; long prostrate sterile shoots absent 44. *M. biflora* (L.) Schinz et Thell.

- + Leaves with 5 veins clearly discernible at base; plants with long procumbent sterile shoots (Caucasus) 36. *M. aizoides* (Boiss.) Bornm.
10. Perennials 11.
- + Annuals 35.
11. Sepals 5-9-nerved 12.
- + Sepals 1-3-nerved 14.
12. Sepals 8-9 mm long, long-acuminate; leaves linear-lanceolate, with 7-11 prominent veins 21. *M. dianthifolia* (Boiss.) Hand.-Mazz.
- + Sepals 4-6 mm long; leaves linear or linear-subulate, obscurely veined 13.
13. Plants more or less covered throughout with glandular hairs; sepals ovate, acute, commonly reddish . . . 19. *M. hirsuta* (M. B.) Hand.-Mazz.
- + Plants glabrous in lower part, more or less glandular-pubescent above, or glabrous throughout; sepals lanceolate-acuminate, pale green 20. *M. oreina* (Mattf.) Schischk.
14. Sepals becoming indurated, mostly 1-nerved (more rarely 3-nerved), with a broad white cartilaginous margin 15.
- + Sepals not becoming indurated at base, 3-nerved, without a white cartilaginous margin 22.
15. Sepals glabrous 16.
- + Sepals minutely glandular-puberulent 20.
16. Seeds sharply tuberculate at margin 17.
- + Seeds smooth or with minute blunt tubercles 18.
17. Plants 5-8 cm high; calyx 4-5 mm long (Caucasus) 13. *M. buschiana* Schischk.
- + Plants 10-25 cm high; calyx 3.5-4 mm long (Ural area) 12. *M. krascheninnikovii* Schischk.
18. Calyx 2.5-3.5 mm long 19.
- + Calyx 4-5.5 mm long (Caucasus) 16. *M. woronowii* Schischk.
19. Sepals 3-3.5 mm long; plants loosely tufted (European part of the USSR) 11. *M. setacea* (Thuill.) Hayek.
- 485 + Calyx 2-2.5 mm long; plants matted (Caucasus) 19. *M. micrantha* Schischk.
20. Calyx 2.5-3 mm long, 3-nerved (S. Transc.) 15. *M. granuliflora* (Fenzl) Grossh.
- + Calyx 4-5 mm long 21.
21. Flowers in a rather compact corymbose inflorescence; sepals 1-nerved; plants densely tufted (Crimea) 17. *M. adenotricha* Schischk.
- + Flowers in a loose cyme; sepals 3-nerved at base; plants loosely tufted (Abkhazia) 18. *M. abchasica* Schischk.
22. Petals 1.5-2 times as long as calyx 23.
- + Petals shorter to scarcely longer than calyx 30.
23. At least some pedicels 5-12 times as long as calyx 24.
- + Pedicels equal to or not more than 2-4 times as long as calyx . . . 28.
24. Plants densely glandular-pubescent; seeds tuberculate (Urals) 23. *M. helmii* (Fisch.) Schischk.
- + Plants glabrous or sparsely glandular-pubescent; seeds smooth . . . 25.

25. Stem monanthous, more rarely 2–5-flowered; seeds 0.4 mm in diameter (Caucasus) 22. *M. biebersteinii* (Rupr.) Schischk.
 + Stem usually bearing several to many flowers; seeds 0.5–1 mm in diameter 26.
26. Shoots reduced to leaf fascicles borne in the axils of lower or all leaves; leaves rigid; seeds 0.5 mm in diameter 27.
 + Axillary fascicles wanting; leaves not rigid; seeds 1 mm in diameter (Altai and Tien Shan) 24. *M. kryloviana* Schischk.
27. Stems and leaves quite glabrous; sepals 5 mm long; capsule shorter than calyx (Far East) 26. *M. gracilipes* Kom.
 + Stems and sometimes leaves puberulent, rarely glabrate; sepals 4 mm long; capsule exceeding calyx 25. *M. jacutica* Schischk.
28. Plants commonly glabrous, loosely tufted; flowering stems 10–25 cm long; leaves rigid 27. *M. lineata* (C. A. M.) Bornm.
 + Plants profusely glandular-pilose, rather densely tufted; stems 5–10 cm long (Crimea and Central Asia) 29.
29. Sepals 4.5 mm long; pedicels 10–20 mm long (Crimea) 28. *M. taurica* (Stev.) Asch. et Gr.
 + Sepals 5–6.5 mm long; pedicels 2–10 mm long (Central Asia) 29. *M. litwinowii* Schischk.
30. Minute plants, 1–2 cm high, forming mosslike mats (only in the Arctic region of E. Siberia) 32. *M. orthotrichoides* Schischk.
 + Plants 3–15 cm high 31.
31. Plants quite glabrous 32.
 + Plants with more or less developed indument 34.
32. Plants 10–20 cm high; flowers in loose cymes; pedicels 2–6 cm long 33. *M. stricta* (Sw.) Hiern.
 + Plants 3–7 cm high, densely or loosely cespitose; flowers solitary or only terminal or both terminal and axillary 33.
33. Leaves ca. 3 mm long; seeds black, rugose, dull (Chukchi area of the Arctic) 34. *M. elegans* (Cham. et Schlecht.) Schischk.
 + Leaves 3–6 cm long; seeds reddish-brown, almost smooth, shining (Central Asia) 35. *M. pusilla* Schischk.
34. Calyx commonly reddish; seeds smooth (Arctic region) 31. *M. rubella* (Whlb.) Graebn.
 + Calyx green; seeds sharply tuberculate (Arcto-alpine region) 30. *M. verna* (L.) Hiern. s. l.
35. (10). Sepals 3.5–7 mm long, becoming indurated at base, 1-nerved or more rarely 3-nerved (section *Euminuartia*) 36.
 + Sepals 2–3.5 mm long, nonindurative (section *Sabulina*) 41.
36. Flowers distinctly pedicellate (the pedicels 1–7 mm long); plants profusely glandular-pilose 37.
 + Flowers sessile or nearly so; indument of simple, rarely glandular hairs 38.
37. Pedicels 1–5 mm long, erect; flowers in compact axillary clusters; outer sepals 5-nerved, the inner 3-nerved; capsule slightly shorter than calyx 5. *M. meyeri* (Boiss.) Bornm.
 + Pedicels 5–7 mm long, obliquely ascending, some erect; flowers loosely disposed; all sepals 3-nerved; capsule half as long as calyx 6. *M. akinfiewii* (Schmalh.) Woron.

38. Sepal 3.5—4 mm long; sepals and bracts uncinately reflexed at tips
 9. *M. sclerantha* (Fisch. et Mey.) Thell.
 + Sepals 4—7 mm long; sepals and bracts not uncinately 39.
39. Sepals narrowly lanceolate-subulate, 1-nerved, white cartilaginous
 at margin 10. *M. glomerata* (M. B.) Degen.
 487 + Sepals lanceolate, distinctly 3-nerved 40.
40. Sepals 5—7 mm long, rounded at base 7. *M. wiesneri* (Stapf) Schischk.
 + Sepals 4—5 mm long, truncate at base, gibbous
 8. *M. intermedia* (Boiss.) Hand.-Mazz.
41. Sepals 3-nerved only at base; leaves more or less ciliate at base
 4. *M. regeliana* (Trautv.) Mattf.
 + Sepals 3-nerved; leaves glabrous at base 42.
42. Capsule one-half to two-thirds as long as calyx
 2. *M. viscosa* (Schreb.) Schinz et Thell.
 + Capsule equaling or exceeding calyx 43.
43. Sepals lanceolate, 3—3.5 mm long, glabrous
 3. *M. hybrida* (Vill.) Schischk.
 + Sepals ovate-lanceolate, 2 mm long, glandular-pubescent
 1. *M. turcomanica* Schischk.

Section 1. **SABULINA** (Rchb.) Asch. et Gr. Synops. V, 1 (1918) 700. —
 Gen. *Sabulina* Rchb. Fl. Germ. excurs. (1832) 185. — *Alsine* sect.
Sabulineae Fenzl in Endl. Gen. (1840) 964; Boiss. Fl. Or. I, 671. —
 Sepals acute, 3-nerved, not becoming indurated at base; petals shorter
 than calyx; seeds small, sharply tuberculate. Annuals with narrowly
 linear leaves.

Series 1. *Tenuifoliae* Mattf. in Engl. Jahrb. LVII, Beibl. 126 (1921) 20. —
 Petals white; leaves 3-nerved, at base 5-nerved.

1. *M. turcomanica* Schischk. in Acta Inst. Bot. Ac. Sc. URSS ser. I, III
 (1936).

Annual, covered throughout with scattered glandular hairs; stem
 4—8 cm long, branched from base; branches ascending; leaves narrowly
 linear, 3.5 mm long and 0.5 mm broad, 3-veined, subacute, slightly dilated
 at base, subpatulous; pedicels filiform, 3—10 mm long, subpatulous to
 erect; sepals ovate-lanceolate, 2 mm long, acute, 3-nerved, scarious-
 margined, sparingly glandular-pilose on the back; petals one-third to
 two-thirds as long as calyx; capsule equaling or scarcely exceeding
 calyx; seeds very small, sharply tuberculate. May—August. (Plate XXVII,
 Figure 1).

Gypseous and stony slopes. — Centr. Asia: Mtn. Turkm. (above Ashkhabad
 and in Kugitang). Endemic. Described from Mt. Makrova (Turkmenistan).
 Type in Leningrad.

2. *M. viscosa* (Schreb.) Schinz et Thell. in Bull. Herb. Boiss. 2 sér. VII
 (1907) 404; Mattf. in Beih. Repert. Spec. nov. XV, 37. — *Alsine viscosa*
 Schreb. Spicil. Fl. Lips. (1771) 30. — *A. breviflora* Gilib. Fl. Lithuan. II

(1781) 150. — *Arenaria pentandra* Dufour in Ann. Sci. Gén. Phys. VII (1820) 292. — *A. tenuifolia* ϵ *viscidula* Ser. in DC. Prodr. I (1824) 406. — *A. viscosa* Fries, Novit. Fl. suec. ed. 2 (1828) 120, non Pers. — *Alsine tenuifolia* β *viscosa* Mert. u. Koch, Deutschl. Fl. III (1831) 290; Shmal'g., Fl. I, 151. — *Sabulina viscosa* Rchb. Fl. Germ. excurs. (1832) 786. — *Alsine tenuifolia* β *tenella* Fenzl in Ldb. Fl. Ross. I (1842) 342. — *Minuartia tenuifolia* subsp. *viscosa* Briq. Prodr. Fl. Cors. I (1910) 531.

Annual, glandular-pubescent in upper part; stems 5–10 cm long, erect, more or less branched; branches ascending; leaves linear-subulate, 4–9 mm long and 0.5 mm broad, subacute, dilated toward base, 3-veined, patulous-ascending; pedicels filiform, 4–10 mm long, patulous-ascending, glandular-pilose; sepals narrowly linear-lanceolate, 2.5–3 mm long, acuminate, with 3 parallel nerves, narrowly scarious-margined, dorsally glandular-pubescent; petals half to nearly as long as calyx; capsule one-third to two-thirds as long as or nearly equaling calyx; seeds very small, sharply tuberculate. May–June.

Stony riverbanks, sandy slopes, and near rocks. European part: U.Dnp., M.Dnp., Bl., V.-Don (Kharkov), Bl.; Caucasus: Cisc. (Temryuk). **Gen. distr.:** S. Scand., Centr. and Atl. Eur., Bal. Described from Germany.

3. *M. hybrida* (Vill.) Schischk. comb. nova. — *Arenaria hybrida* Vill. Prosp. pl. Dauph. (1779) 48. — *A. viscidula* Thuill. Fl. Paris. ed. 2 (1799) 219. — *A. dubia* Suter, Fl. Helv. I (1802) 266. — *A. tenuifolia* δ *hybrida* Ser. in DC. Prodr. I (1824) 406. — *Alsine tenuifolia* α *grandiflora* Fenzl in Ldb. Fl. Ross. I (1842) 342; Shmal'g., Fl. I, 151. — *A. tenuifolia* α *genuina* Boiss. Fl. Or. I (1867) 686. — *A. hybrida* Jord. Pugill. (1852) 33. — *M. tenuifolia* subsp. *eu-tenuifolia* var. *hybrida* Briq. Prodr. Fl. cors. I (1910) 531. — *M. tenuifolia* subsp. 2 *hybrida* Mattf. in Engl. Bot. Jahrb. LVII, Beibl. 126 (1921) 29.

Annual; stem 3–10 cm long, slender, branched from base, glabrous except for scattered glandular hairs in upper part; branches ascending; leaves narrowly linear, 3–10 mm long and 0.5 mm broad, acute, 3-veined; pedicels filiform, 5–15 mm long; sepals lanceolate, 3–3.5 mm long, distinctly 3-nerved, acute, glabrous; petals about one-half to two-thirds as long as calyx; stamens commonly 10; capsule equaling calyx. May–July.

Stony slopes, sandy places, and rarely plowland. — European part: U. V. (introduced?), Bl., Crim.; Caucasus: Cisc. (Stavropol), Dag., E. and S. Transc.; Centr. Asia: Pam.-Al., Syr D. (Fergana). **Gen. distr.:** Atl. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from S. France. Type in Paris.

4. *M. regeliana* (Trautv.) Mattf. in Engl. Bot. Jahrb. LVII, Beibl. 126 (1921) 29; in Beih. Repert. spec. nov. XV, 44; Kryl., Fl. Zap. Sib. V, 1020. — *Alsine tenuifolia* var. *Regeliana* Trautv. in Bull. Soc. Nat. Mosc. no. 22 (1866) 156. — *A. tenuifolia* δ *brachypetala* Fenzl in Ldb. Fl. Ross. I (1842) 342; Rgl. Ind. sem. Hort. Petrop. (1856) 35. — Ic.: Fl. Yugo-Vost. IV, 262, fig. 304.

Annual; stem solitary, branched from base, 5–15 cm long, glabrous; leaves narrowly linear, 2–10 mm long and 0.3–0.5 mm broad, ciliate at the sometimes dilated base, 3–5-veined, the lateral veins faint; pedicels filiform,

3—17 mm long; sepals ovate-lanceolate to lanceolate, 2.5—3.5 mm long and 0.5—1 mm broad, tapering at apex to a short point, sometimes reflexed in fruit, glabrous, 3-nerved at base, 1-nerved in upper part, the margin white scarious; petals oblong, abruptly narrowing at base to a short claw, one-half to two-thirds as long as calyx; stamens 3—10; capsule oblong-ovoid, usually exceeding, more rarely equaling or shorter than calyx; seeds ca. 0.5 mm long, finely tuberculate. April—June.

Solonetztes, grassy or desert slopes, and semideserts. — European part: L. V.; Caucasus: E. Transc.; W. Siberia: Irt.; Centr. Asia: Ar.-Casp., Balkh., T. Sh., Dzu.-Tarb. (Saur), Kara K., Mtn. Turkm. (Kushka). Endemic. Described from N. Kazakhstan (Ayaguz, Tersakan, Ulutau). Type in Leningrad.

Section 2. **EUMINUARTIA** (Fenzl) Graebn. in Asch. et Gr. Synops. V, 1 (1918) 710. — *Alsine* sect. *Minuartia* Fenzl in Endl. Gen. pl. (1840) 964. — Sepals acute, 1—3-nerved, becoming indurated at base. Annuals and perennials.

Series 1. **Montanae** Mattf. in Engl. Bot. Jahrb. Beibl. 126 (1921) 29. — Sepals 3-nerved, the outer sometimes 5-nerved, green or narrowly scarious-margined; leaves linear or linear-lanceolate, flat, 5—7 (9)-nerved; bracts leaflike.

5. **M. meyeri** (Boiss.) Bornm. in Beih. Bot. Ctrbl. XXVII, II (1919) 318. — *Alsine meyeri* Boiss. Diagn. Ser. 1, 8 (1849) 96; Boiss. Fl. Or. I, 682. — *Arenaria globulosa* β *nana* C. A. M. Verzeichn. Pfl. Cauc. (1831) 219. — *Alsine globulosa* Fenzl in Ldb. Fl. Ross. I, 344, non Labill. — *A. billardieri* Boiss., l. c. (1849) 95, excl. syn. Labill. — *A. brevis* Boiss., l. c. (1849) 96. — *Arenaria meyeri* Edgew. et Hook. f. in Fl. Brit. Ind. I (1872) 236, non Fenzl. — *Alsine rudbarensis* Stapf, Denkschr. K. K. Acad. Wiss. Wien (1886) 20, pro parte.

Annual, covered throughout with spreading glandular hairs; stems 4—20 cm long, branched from base; leaves linear, 10—25 mm long and 0.5—1.5 mm broad, 7-veined, acute, ascending or spreading; flowers in compact corymbs at the ends of stems and short branches; pedicels erect, 1—5 mm long; bracts herbaceous, resembling foliar leaves but shorter; sepals lanceolate, 5—8 mm long, acuminate, unequal, the other 5-nerved, the shorter inner ones 3-nerved; petals ovate-oblong, one-third as long as calyx; capsule oblong, two-thirds as long as calyx; seeds rounded-reniform, 0.7—0.8 mm in diameter, finely tuberculate. April—May.

Stony and gravelly slopes, semideserts, rising in mountains to an altitude of 1,500 m. — Caucasus: E. and S. Transc.; Centr. Asia: Mtn. Turkm., Kara K., Pam.-Al., T. Sh. **Gen. distr.:** As. Min., Arm.-Kurd., Iran. Described from Talysh. Type in Geneva.

6. **M. akinfiewii** (Schmalh.) Woron. in Fom. and Voron., Opred. rast. Kavk. II, 2 (1914) 176. — *Alsine akinfiewii* Schmalh. in Ber. Deutsch. Bot. Ges. X (1892) 287; Mattf. in Beihefte z. Repert. spec. nov. XV, 61.

Annual; stem 5—15 cm long, branched from base, rarely simple, glandular-pilose; leaves linear, 6—15 mm long and 1—2 mm broad, acute,

7-veined, glandular-pilose; pedicels 4–5 mm long, erect or ascending; sepals lanceolate, 5–7 mm long, unequal, 3-nerved, acuminate; petals oblong, acutish, one-third to two-thirds as long as calyx; capsule half as long as calyx. June.

Argillaceous southern slopes. — Caucasus: E. and S. Transc. Endemic. Described from Borzhomi. Type in Leningrad (?).

7. *M. wiesneri* (Stapf) Schischk. comb. nova. — *Alsine wiesneri* Stapf in Denkschr. K. K. Acad. Wien (1886) 20. — *M. montana* Woron. in Opred. rast. Kavk. i Kryma II, 2 (1914) 176; Mattf. in Beih. Fedde Repert. Spec. nov. XV (1922) 63, ex parte, non L. — *Arenaria globosa* Hohenack. Enum. pl. Elisavethpol. p. 232, non Spreng. — *Alsine montana* Fenzl, Verbr. Als. (1833) tab. ad. p. 46, ex parte, non Crantz; Shmal'g., Fl. I, 152. — *Alsine caucasica* Boiss. Diagn. Ser. 2, I (1853) 87 nec Rupr. (1869), nec *Arenaria caucasica* Adams ex Ldb. Fl. Ross. I (1842) 354, nec *Minuartia caucasica* Mattf. — *M. campestris* DC. Prodr. III (1828) 380 (non L. Sp. pl. (1753) 89). — *Arenaria caucasica* Fernald in Rhodora XXI, no. 241 (1919) 5. — *A. montana* β *caucasica* Boiss. Fl. Or. I (1867) 685.

Annual; stem 4–7 cm long, profusely covered, like the leaves, with short crisp hairs; leaves linear, 1.5 cm long and 7.5–1 [?] broad, acute, 3-veined, ciliate and 5–7-veined at the dilated base; bracts herbaceous, linear, long-acuminate, exceeding calyx, spatulous-recurved; flowers sessile, in dense clusters; sepals lanceolate-acuminate, unequal, 5–7 mm long, rounded at base; petals very small, ovate; capsule cylindric, two-thirds as long as calyx; seeds globular-reniform, finely tuberculate. June.

Stony slopes. — European part: Crim.; Caucasus: Dag., Cisc., E. and S. Transc., Tal. **Gen. distr.:** As. Min., Arm.-Kurd., Iran. Described from Iran. Type in Vienna.

Note. *M. wiesneri* is very closely related to *M. montana* L. from which it is distinguishable only by minor characters, but the two plants have distinct distribution areas. The western *M. montana* occupies the Iberian Peninsula and NW Africa, while *M. wiesneri* is isolated from it and is distributed through Asia Minor, Iran, Transcaucasia, and the Crimea.

8. *M. intermedia* (Boiss.) Hand.-Mazz. in Ann. K. K. Hofm. XXVI (1912) 148; Mattf. in Beih. Repert. spec. nov. XV, 67. — *Alsine intermedia* Boiss. in Bal. pl. exs. (1855) nom.; Fl. Or. I (1867) 685. — *Arenaria intermedia* Fernald in Rhodora XXI, no. 241 (1919) 6. — Exs.: Bornm. It. Anat. tert. (1899) no. 4187.

Annual; stem 7–12 cm long, branched, covered with crisp hairs; leaves linear, 1–2 cm long and 0.3–1 mm broad, acute, 3–5-veined, ciliate at the dilated base; bracts linear, considerably exceeding calyx; flowers sessile, in a long and rather loose inflorescence; sepals lanceolate, 4–5 mm long, unequal, acute, prominently 3-nerved; truncate and gibbous at base; petals very small, oblong; capsule two-thirds as long as calyx; seeds finely tuberculate. May.

Stony southern slopes. — Caucasus: E. and S. Transc. **Gen. distr.:** As. Min., Arm.-Kurd. Described from Cilicia and Armenia. Type in Geneva.

Series 2. *Hispanicae* Mattf. in Engl. Bot. Jahrb. LXII, Beibl. 126 (1921) 29 ex parte. — Leaves setiform, dilated at base, 1–3-veined, covered at base with crisp hairs; flowers capitate; bracts elongated, apically hamate, recurved, exceeding the head; seeds few. Annuals.

9. *M. sclerantha* (Fisch. et Mey.) Thell. in Mém. Soc. Sc. Nat. Math. Cherbourg XXXVIII (1912) 231; Mattf. in Beih. Repert. Spec. nov. XV, 75. — *Alsine sclerantha* Fisch. et Mey. in Bull. Soc. Nat. Mosc. (1848) 111, 400; Fenzl in Ldb. Fl. Ross. I, 343; Boiss. Fl. Or. I, 685. — Exs.: Herb. Fl. cauc., no. 174; Pl. orient. exs., no. 227.

Annual; stem furcately branched from the very base, 3–7 cm high, strongly crisp-pubescent; leaves setiform, 6–10 mm long and 0.2–0.7 mm broad, dilated at base and with 3–5 basal veins, ciliate-margined; flowers in compact almost capitate inflorescences; bracts herbaceous, rigid, linear, uncinately-tipped, exceeding calyx; sepals linear-lanceolate, 3.5–4 mm long, uncinately, distinctly 3-nerved, three of them shorter than the rest; petals wanting or rudimentary; seeds smooth. April–May.

Stony slopes and dry river beds. — Caucasus: E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm. (Shauro-Gaudan, Kizil-Arvat). Gen. distr.: As. Min., Arm.-Kurd., Iran. Described from Talysh. Type in Leningrad.

Series 3. *Fasciculatae* Mattf. in Engl. Bot. Jahrb. LVII Beibl. 126 (1921) 29. — Sepals 1-nerved, with a broad scarious margin; flowers in compact capitate clusters, the upper part of stem and inflorescences covered with glandular hairs. Commonly annuals.

10. *M. glomerata* (M. B.) Degen in Mitt. Nat. Ver. Steiermark XLVI (1910) 319. — *M. glomerata* subsp. *euglomerata* Mattf. in Beih. Repert. spec. nov. XV (1922) 83. — *Arenaria glomerata* M. B. Fl. taur.-cauc. I (1808) 350. — *Alsine glomerata* Fenzl, Verbr. Alsin. (1833) tab. ad. p. 46; Fenzl in Ldb. Fl. Ross. I, 344; Boiss. Fl. Or. I, 682; Shmal'g., Fl. I, 152. — Exs.: HFR no. 2853; Fl. exs. Austr.-Hung., no. 569.

Annual; stems usually numerous, rarely solitary, ascending, simple or sometimes branched from the base, 3–20 cm long, covered with short soft glandular hairs; leaves subulate, appressed to stem, prominently 3-veined, acute, 5–10 mm long, connate in pairs at the somewhat dilated base, the margin ciliate especially in lower part; flowers in a rather compact corymbose inflorescence at the end of stem; pedicels 0.5–1 mm long; sepals narrowly lanceolate-subulate, 5–6 mm long, with a white midrib flanked by 2 narrow green stripes, sparsely covered on the back with simple or glandular hairs, the margin cartilaginous; petals one-half to two-thirds as long as calyx; capsule about one-half to two-thirds as long as calyx. May–July. (Plate XXVII, Figure 2).

Rocks and stony, often calcareous slopes. — European part: M. Dnp., Bl., Crim.; Caucasus: W. Transc. (Novorossiisk). Gen. distr.: S. part of Centr. Eur., Bal. Described from Chatyr-dag (Crimea). Type in Leningrad.

Note. Fenzl (l. c.) established for this species three varieties: α *longebracteata*, β *brevibracteata*, γ *echinosperma*. Mattfeld (l. c.) doubts the feasibility of segregating these three forms in view of the lack of any consistency in characters pertaining to length of bracts and

seed surface. A study of the ample material preserved at the Herbarium of the Botanical Institute of the Academy of Sciences also compels us to reject Mattfeld's views.

Series 4. **Setaceae** Mattf. in Engl. Bot. Jahrb. Beibl. 126 (1921) 30. — Sepals 1-nerved, with coriaceous margin; flowers long-pedicelated, in rather loose inflorescences. Perennials.

493 11. **M. setacea** (Thuill.) Hayek, Fl. Steierm. I (1908) 271; Mattf. in Beih. Repert. Spec. nov. XV, 95, ex parte. — *Arenaria setacea* Thuill. Fl. Paris. ed. 2 (1799) 218. — *A. saxatilis* L. Sp. pl. (1753) 424 partim. — *A. heteromalla* Pers. Syn. I (1805) 504. — *Alsine setacea* Mert. u. Koch, Deutschl. Fl. III (1831) 286; Shmal'g., Fl. I, 152. — *A. setacea* β *philosperma* Fenzl in Ldb. Fl. Ross. I (1842) 345. — Exs.: Callier, Iter taur. III, no. 556, 557; exs. Austr.-Hung., no. 3255.

Perennial, very slightly woody at base; stems 10–20 (30) cm long, simple except in inflorescence, the lower part of stem and leaves scabrous with short hairs, the upper part glabrous or very rarely scabrous; leaves setaceous, 8–15 mm long and 0.2 mm broad, acute, dilated at base, often reflexed; flowers at the ends of stems and branches, in few-flowered dichasia sometimes forming a corymb; pedicels glabrous, 2–7 mm long; sepals ovate-lanceolate, ca. 3 mm long, acute, glabrous, with a marked midrib, 2 green stripes, and a broad coriaceous margin, becoming indurated at base; petals ovate, as long as or scarcely longer than calyx; capsule equaling calyx; seeds reiniform-globular, obscurely blunt-tuberculate on the back, ca. 0.5 mm long. May–July. (Plate XXVII, Figure 3).

Calcareous rocks and stony slopes, pebbles, and wood margins. — European part: U. Dnp., M. Dnp., Bl., Crim., L. Don, V.-Don. **Gen. distr.:** Centr. Eur., Atl. Eur., Bal. Described from the vicinity of Paris. Type in Paris.

12. **M. krashennikovii** Schischk. in Acta Inst. Bot. ser. I, III (1936). — *M. setacea* α *trachysperma* Fenzl in Ldb. Fl. Ross. I (1841) 345. — *M. setacea* Shishk. in Fl. Yugo-Vost. IV, 263, non Hayek. — Exs.: HFR no. 911.

Perennial; stems numerous, puberulent in lower part, branched in inflorescence; leaves subulate-setaceous, 8–20 mm long and 0.2–0.5 mm broad, 3-veined, subappressed to stem; bracts ovate, acute, with white membranous margin; sepals ovate, acute, 3–4 mm long, with a marked midrib flanked by 2 narrow green stripes, the margin membranous; petals as long as or scarcely longer than calyx; capsule about equaling calyx; seeds 0.75–1 mm long, sharply tuberculate on the back. July–August. (Plate XXVII, Figure 4).

Stony slopes and calcareous rocks. — European part: V.-Kama (Urals). Endemic. Described from Mt. Egozinskaya near Kyshtymskii Zavod (Sverdlovsk Region). Type in Leningrad.

13. **M. buschiana** Schischk. in Addenda V, p. 672. — *Alsine saxatilis* Rupr. Fl. Cauc. 16, ex parte, non L.

Perennial, loosely tufted; stems numerous, 6–8 (12) cm long, ascending, branched only in inflorescence, minutely scaberulous or glabrate; leaves

494 setaceous, ca. 10 mm long and 0.2–0.6 mm broad, glabrous, 3-veined, appressed to stem, the margin minutely ciliate; flowers commonly in 3–7-flowered dichasia at the end of stem; pedicels 2–7 mm long; bracts lanceolate, ca. 2 mm long, acute, narrowly membranous-margined; sepals ovate-lanceolate, 3–5 mm long, acute, with a prominent midrib flanked by 2 green stripes and a whitish coriaceous margin; petals oblong-ovate, 1.5 times as long as calyx; seeds reniform-rotund, 0.75–1 mm long. June–July.

Rocks in the alpine and subalpine zones. — Caucasus: Gr. Cauc., mountains of W. Transc. Endemic. Described from Mt. Baranul. Type in Leningrad; cotype in Tiflis.

14. *M. micrantha* Schischk. in Addenda V, p. 672.

Perennial, woody at base, profusely branched and forming a dense tuft; herbaceous stems numerous, ascending at base, then erect, 6–20 cm long, simple, puberulent; leaves linear-subulate, 5–12 mm long and in lower part 0.3–1 mm broad, ciliate-margined, 3-veined, appressed to stem or subpatulous; flowers in 3–7-flowered dichasia at the end of stem; pedicels glabrous, 2–7 mm long; sepals ovate-lanceolate, 2.6–3.5 mm long, 1-nerved, acute; petals narrow-ovate, about as long as or shorter than calyx; capsule shorter than calyx; seeds ca. 0.6 mm long, the margin obscurely and minutely tuberculate. July–September.

Stony slopes. — Caucasus: E. and S. Transc. **Gen. distr.:** former Artvin District. Described from the Al'vana-su Gorge (Artvin District). Type in Leningrad.

15. *M. granuliflora* (Fenzl) Grossh. in Fl. Kavk. II (1930) 381. — *Alsine granuliflora* Fenzl in Ldb. Fl. Ross. II (1842) 346. — *A. setacea* ζ *granuliflora* Boiss. Fl. Or. I (1867) 680; Voron. in Fom. and Voron., Opred. rast. Kavk. i Kryma II, 2, 177.

Perennial, densely canescent throughout, in upper part glandular and viscous, very slightly woody at base, rather loosely tufted; herbaceous stems simple or branched, erect, 5–15 cm long; leaves subulate-filiform, 3-veined, erect; inflorescence terminal, many-flowered, corymbose; bracts broad-ovate, half-scarious, 3-nerved; pedicels half as long as or the lower very slightly longer than calyx; sepals ovate, 2.5–3.5 mm long, acute to obtusish, glandular-pubescent on the back; petals rounded-ovate, slightly longer than calyx. June.

Stony slopes. — Caucasus: reported for S. Transc. **Gen. distr.:** Arm.-Kurd. Described from parts of Transcaucasia bordering on Turkey. Type in Leningrad (?).

495 16. *M. woronowii* Schischk. in Addenda V, p. 672 (1936). — *Alsine saxatilis* Rupr. Fl. Cauc. 216, non L., ex parte.

Perennial, very slightly woody at base, tufted; stems numerous, 8–25 cm long, branched only in inflorescence, puberulent in lower part, nearly always glabrous above; leaves setaceous, 5–11 mm long and 0.2–0.5 mm broad, acute, scarcely dilated toward base, commonly appressed to stem; inflorescence a few-flowered terminal dichasium; pedicels filiform, glabrous, 4–12 mm long; sepals lanceolate, 4–5.5 (6) mm long, acute or

acuminate, 1-nerved; petals slightly longer than calyx; seeds oblong, ca. 1 mm long, smooth. June—July.

Rocks. — Caucasus: E. and S. Transc. **Gen. distr.:** Arm.-Kurd. Described from the vicinity of Tiflis. Type in Leningrad.

17. *M. adenotricha* Schischk. in Acta Inst. Bot. ser. I, III (1936). — *Alsine setacea* γ *pubescens* Fenzl in Ldb. Fl. Ross. I (1842) 346, quoad pl. taur. — *A. setacea* β *anatolica* Syreisz. in Izv. Glavn. Bot. Sada XXVIII (1929) 526, part., non Boiss.

Perennial, profusely branched from woody base, densely tufted; herbaceous stems 5–10 cm long, branched only in inflorescence, glandular-puberulent throughout; leaves filiform-subulate, ca. 10 mm long and 0.3 mm broad, acute, ciliolate-margined, white-margined at the somewhat dilated base, prominently 3-veined beneath; terminal few-flowered cymes forming a subcorymbose inflorescence; pedicels glandular-pubescent, 2–6 mm long; bracts ovate, acute, 3-nerved, broadly membranous-margined; sepals 4–5 mm long, ovate-lanceolate, glandular-pubescent on the green stripes, often purple-tinged at margin; petals ovate-oblong, as long as or slightly longer than calyx; capsule equaling calyx; seeds rounded-reniform, obscurely blunt-tubercled on the back, ca. 0.75 mm in diameter. (Plate XXVII, Figure 5).

Rocks in mountains. — European part: Crim. (Chatyr-dag, Angor-Burun, Eklizi-Burun, Demerdzhi, Karadag). Endemic. Described from Mt. Chatyr-dag. Type in Leningrad.

18. *M. abchasica* Schischk. in Acta Inst. Bot. Ac. Sc. URSS, Ser. I, III (1936).

496 Perennial, profusely branched from the very slightly woody base, loosely tufted; herbaceous stems 10–13 cm long, glandular-puberulent throughout, branched in inflorescence; leaves filiform-subulate, 5–10 mm long and ca. 0.3 mm broad, acute, glabrous, ciliolate-margined, narrowly scarious-margined at the somewhat dilated base, prominently 3-veined beneath; inflorescence a 3–7-flowered cyme; pedicels glandular-puberulent, 5–10 mm long; bracts small, lanceolate, acute; sepals ovate-lanceolate, 4–5 mm long, commonly 3-nerved at base, narrowly white-margined, sparingly glandular-pubescent on the back; petals ovate-oblong, slightly longer than calyx; seeds unknown. August–September.

Rocks, mainly calcareous, in the alpine zone, at altitudes of 2,000–2,500 m. — Caucasus: W. part of Gr. Cauc. (Bzybskii and Ertsoğ ranges). Endemic. Described from Abkhazia (Bzybskii Range). Type in Leningrad.

Section 3. **TRYPHANE** Fenzl in Endl. Genera pl. (1840) 965, excl. *M. verna*; Rchb. Nomencl. (1841) 205, pro gen. — Sepals 5–7-nerved, nonindurative, spreading at anthesis; seeds finely rugulose or tuberculate. Perennials with linear-subulate or setaceous leaves.

19. *M. hirsuta* (M. B.) Hand.-Mazz. in Ann. K. K. Hofm. Wien XXIII (1909) 152, ex parte. — *M. hirsuta* subsp. *falcata* var. *vestita* Mattf. in Beih. Repert. Spec. nov. XV (1922) 115. — *Arenaria hirsuta* M. B.



PLATE XXVII. 1. *Minuartia turcomanica* Schischk. — 2. *M. glomerata* (M.B.) Deg. — 3. *M. setacea* (Thuill.) Hayek, flower. — 4. *M. krascheninnikovii* Schischk. — 5. *M. adenotricha* Schischk., flower. — 6. *M. hirsuta* (M.B.) Hand.-Mazz. — 7. *M. helmii* (Fisch.) Schischk. — 8. *M. biebersteinii* (Rupr.) Schischk. — 9. *M. rubella* (Whlb.) Graebn.

Fl. taur.-cauc. I (1808) 349. — *Alsine hirsuta* γ *vestita* Fenzl in Ldb. Fl. Ross. I (1842) 347, part. — *Alsine recurva* Shmal'g., Fl. I, 151, non Wahl. — *A. recurva* β *hirsuta* Boiss. Fl. Or. I (1867) 675. — Exs.: HFR no. 961.

Perennial; stems numerous, ascending, 3–20 cm long, commonly covered with spreading glandular hairs and with densely leafy sterile shoots at base; leaves linear-subulate, 5–15 mm long, 0.5–1 mm broad, 3–7-veined, glandular-pilose, commonly reflexed, acute, somewhat dilated at base; stems 3–12-flowered; pedicels glandular-pilose, shorter than calyx, more rarely equaling it or twice as long; sepals reddish, ovate, 4–5 mm long, 5–7-nerved, acute, narrowly scarious-margined, glandular-pubescent on the back; petals oblong, ca. 2 mm broad, slightly longer or shorter than calyx; capsule equaling calyx; seeds sharply tuberculate. May–September. (Plate XXVII, Figure 6).

Subalpine meadows and stony slopes in the high-mountain zone. — European part: Crim. (throughout the Yaila*). Endemic. Described from the Crimea (Mt. Chatyr-dag). Type in Leningrad.

499 Note. This plant is endemic for the Crimean Yaila. In the Caucasus and in Transcaucasia it is replaced by the related species *M. oreina* (Mattf.) Schischk. Mattfield, l. c., maintains that typical *A. recurva* All., to which the Crimean plant was referred by some authors, does not occur anywhere in the East and that its distribution is confined to France, Italy, Switzerland, and the Balkan Peninsula. While sharing Mattfield's view in this case, we believe that typical *M. hirsuta* does not grow anywhere outside the mountains of the Crimea.

20. *M. oreina* (Mattf.) Schischk. in Berichte d. Tomsk. Staats-Univers. 80 (1929) 443; Grossg., Fl. Kavk. II, 392. — *M. hirsuta* subsp. *oreina* Mattf. in Engl. Jahrb. LVII Beibl. 126 (1921) 30 nom.; in Beih. Repert. Spec. nov. XV (1922) 118, descr. — *Alsine hirsuta* β *denudata* Fenzl in Ldb. Fl. Ross. I (1842) 347. — *A. recurva* α *nivalis* et β *hirsuta* Boiss. Fl. Or. I (1867) 657, ex parte. — *A. recurva* Rupr. Fl. Cauc. 210, non Whlb. — *Minuartia condensata* Woron. in Opred. rast. Kavk. i Kryma II, 2 (1914) 178, non *Alsine condensata* Presl.

Perennial, densely tufted; stems numerous, 3–15 cm long, often glabrous in lower part, glandular-pubescent above, or the whole plant glabrous (var. *glaberrima* Medw.); leaves linear, 0.7–1.5 cm long and 0.5–1 mm broad, acute, the cauline shorter than internodes; inflorescence a loose 3–15-flowered corymbiform panicle; pedicels 3–15 mm long; bracts acuminate, 4–6 mm long, glandular-pubescent or glabrate; petals white, slightly longer than calyx, gradually tapering to a claw; capsule about equaling calyx; seeds reniform, ca. 1 mm long, almost smooth or slightly sharp-tubercled on the back. June–July.

Rocks and stony slopes in the alpine zone, at altitudes between 2,000 and 3,400 m. — Caucasus: Gr. Cauc., mountains of E. and S. Transc. Gen. distr.: As. Min., Arm.-Kurd., Iran. Described (subsp.) from Asia Minor and Iran. Type in Berlin.

* [Monoclinial limestone plateau dissected by karst valleys.]

Section 4. **LANCEOLATAE** Fenzl in Endl. Gen. pl. (1840) 965; Boiss. Fl. Or. I, 673, p. p.; Mattf. in Beih. Repert. spec. nov. XV, 128. — Sepals 5–13-nerved, erect at anthesis; seeds with fimbriate-pectinate margin. Perennials with linear-lanceolate leaves.

Series 1. **Dianthifoliae** Mattf. in Engl. Bot. Jahrb. LVII, Beibl. 126 (1921) 31 et in Beihefte Repert. spec. nov. XV, 130. — Sepals 9–13-nerved, acuminate.

21. **M. dianthifolia** (Boiss.) Hand.-Mazz. in Ann. K. K. Hofm. Wien XXVI (1912) 147; Mattf. in Beih. Repert. spec. nov. XV, 131; Grossg., Fl. Kavk. II, 391. — *Alsine dianthifolia* Boiss. Diagn. Ser. I, 8 (1849) 99; Boiss. Fl. Or. I, 674. — *Arenaria dianthifolia* Fernald in Rhodora XXI, no. 241 500 (1919) 7.

Perennial, densely tufted, with numerous reduced branches, these densely covered with remnants of dead leaves and terminating in densely leafy shoots; flowering stems 10–15 cm long, glabrous in lower part, glandular-pubescent above, simple, bearing 4–6 leaf pairs; leaves of reduced shoots linear-lanceolate, 10–12 mm long, 1–1.5 mm broad, rigid, acute, 7–10-veined; cauline leaves resembling the radical, shorter than internodes; flowers 3–5 at the ends of stems; pedicels about as long as calyx; bracts herbaceous, scarious-margined; sepals linear-lanceolate, acute, 9–13-nerved, somewhat unequal, 8–9 mm long, glandular-pubescent, scarious-margined; petals equal, oblong, obtuse; capsule shorter than calyx. June.

Rocks. — Caucasus: S. Transc. (found in the Shikh-yurda Pass in the Zangezur Range). **Gen. distr.:** As. Min., Arm.-Kurd., Iran. Described from Asia Minor (Akdag Range in [ancient] Lycia). Type in Geneva.

Note. Specimens from N. Iran and S. Transcaucasia differ somewhat from the plant as described from Asia Minor and we have noted it for description as a new species, *M. longisepala* Schischk. However, in the absence of sufficient material from Asia Minor, we retain the name *M. dianthifolia* for the Zangezur plants.

Section 5. **ACUTIFLORAE** Fenzl in Endl. Gen. pl. (1840) 965; in Ldb. Fl. Ross. I, 350; Mattf. in Beih. Repert. spec. nov. XV, 146. — Calyx nonindurative; sepals 3-nerved, acuminate, erect at anthesis; petals obovate-oblong, 1.5 times as long as calyx.

Series 1. **Flaccidae** Mattf. in Engl. Bot. Jahrb. LXII Beibl. 126 (1921) 31 et in Beih. Repert. spec. nov. XV, 148. — Leaves flat, rather broad; nerves of calyx slender; seeds finely tuberculate.

22. **M. biebersteinii** (Rupr.) Schischk. in Journal of the Governm. bot. Gard. Nikita, Jalta X, 2 (1928) 38; Grossg., Fl. Kavk. II (1930) 392. — *Alsine biebersteinii* Rupr. Fl. Cauc. (1869) 215. — *Arenaria austriaca* M. B. Fl. taur.-cauc. I, 348; III, 310, non Jacq. — *Alsine subuniflora* Alb. in Acta Horti Tiflis. I (1895) 35. — *Minuartia subuniflora* Woron. in Fom. and Voron., Opred. rast. Kavk. II, 2 (1914) 178. — *M. flaccida* f. *biebersteinii* Mattf. im Beihefte Repert. spec. nov. XV (1922) 152. — *M. villarsii* Grossg., Fl. Kav. II, 393, non Balb.

Perennial; stems numerous, ascending at base, 7–20 cm long, glabrous or slightly glandular-pubescent; leaves linear, 1–2 cm long and 0.5–1 mm broad, 3-nerved, glabrous or sparsely glandular-pilose, acute, commonly reflexed; flowers 1–5 at the ends of stems; pedicels filiform, glabrous, 5–12 times as long as calyx; sepals lanceolate, ca. 5 mm long, acute, 3-nerved, glabrous or slightly glandular-pubescent; petals 2–2.5 times as long as calyx; capsule equaling calyx; seeds small, 0.4 mm long, finely striate. June–July. (Plate XXVII, Figure 8).

Rocks and stony slopes in the alpine zone, glacial moraines, and rocks near the timberline, at altitudes of 1,800–3,200 m. — Caucasus: Gr. Cauc., Dag. Endemic. Described from the Greater Caucasus (Ardon, Terek, Dagestan). Type in Leningrad.

23. *M. helmii* (Fisch.) Schischk. in Journ. of the Govern. botan. Gard. Nikita X, 2 (1928) 38; Kryl., Fl. Zap. Sib. V, 1025. — *Arenaria helmii* Fisch. ex Ser. in DC. Prodr. I (1824) 404. — *A. laxa* Fisch. ex DC, l. c., (1824) nom. — *A. grandiflora* δ *stolonifera* Ser. in DC, l. c. (1824) ex parte. — *Alsine villarsii* α *trachysperma* et β *psilosperma* Fenzl in Ldb. Fl. Ross. I (1842) 351–352, ex parte. — *Minuartia flaccida* Mattf. in Beih. Repert. spec. nov. XV, 150, non Schinz et Thell. — Ic.: Fl. Yugo-Vost., fig. 305. — Exs.: HFR no. 2854.

Perennial, densely tufted; stems numerous, 5–15 cm long, densely glandular-pubescent; leaves narrowly linear, 5–15 mm long and ca. 0.5 mm broad, ascending or falcately recurved, densely glandular-pubescent; stems 1- or 2-flowered; pedicels 5–10 times as long as calyx; sepals ovate, ca. 4 mm long, short-acuminate, obscurely 3-nerved, glandular-pubescent; petals obovate, twice as long as calyx; capsule slightly exceeding calyx; seeds small, sharply tuberculate. June. (Plate XXVII, Figure 7).

Rocks and stony slopes. — European part: V.-Kama (Central and Southern Urals). Endemic. Described from the Urals. Type in Geneva; cotype in Leningrad.

Note. Fenzl reported two varieties for the Ural Mountains, var. *trachysperma* and var. *psilosperma*. He relates these varieties to *Alsine villarsii*. He had seen the former himself, but cited the latter from de Candolle's report. In ripe seeds of specimens from the Urals that I have examined, the sharp tubercles are pronounced only on the back whereas on the lateral faces they tend to be less developed.

24. *M. kryloviana* Schischk. in Animadv. Syst. ex Herbar. Univers. Toms., no. 1 (1930); Kryl., Fl. Zap. Sib. V, 1026. — *Arenaria helmii* Bge. in Ldb. Fl. Alt. II (1830) 169, non Fisch. — *Alsine villarsii* β *psilosperma* Fenzl in Ldb. Fl. Ross. I (1842) 351, ex parte. — *Minuartia flaccida* Mattf. Beih. Repert. spec. nov. XV, 150–154, ex parte.

Perennial; stems very slightly woody at base, prostrate and branched; herbaceous stems numerous, erect, glabrous, 5–20 cm long, forming a loose tuft; leaves narrowly linear, 5–15 (23) mm long and 1/3–1 mm broad, commonly glabrous, more rarely somewhat glandular-pubescent, 3-veined beneath, acuminate; cymes terminal, loose; pedicels glabrous, 1.5–3 cm long; sepals ovate-lanceolate, 3.5–5 mm long, long-acuminate, 3-nerved, glabrous; petals white, about twice as long as calyx, oblong-obovate,

gradually tapering toward base, entire or very slightly notched or toothed; capsule ovate-oblong, about equaling calyx; seeds reniform, ca. 1 mm in diameter, almost smooth. June.

Rocks and stony slopes. — W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. Endemic. Described from Altai. Type in Tomsk.

Series 2. *Juniperinae* Mattf. in Engl. Bot. Jahrb. LVII Beibl. 126 (1921) 32; in Beih. Fedde Repert. spec. nov. XV, 156. — Leaves thickish, semiterete; nerves of calyx very pronounced; seeds commonly smooth.

25. *M. jacutica* Schischk. nom. nov. — *Alsine michauxii* α *erecta* Rgl. in Bull. Soc. Nat. Mosc. XXXV, I (1862) 233, non *A. michauxii* Fenzl (1833). — Ic.: Rgl., l. c., tab. VIII, f. 1–5.

Perennial, loosely tufted; stems numerous, crowded, simple or branched; leaves narrowly linear, 5–9 mm long and 0.3–0.5 mm broad, sparsely and minutely pilulose or glabrate, with a thick midrib, hence almost trigonous, and 2 obsolescent lateral veins, acute, subtending leafy axillary fascicles; inflorescence loose, few-flowered; pedicels filiform, 2.5–6 cm long, sparsely covered with short hairs or glabrate; bracts lanceolate-linear, narrowly scarious-margined; sepals ovate, 4 mm long and 1.5 mm broad, acute, with scattered hairs or glabrous, 3-nerved; petals white, oblong, twice as long as sepals; capsule ovoid, slightly exceeding calyx; seeds reniform, 0.5 mm long, smooth. July.

E. Siberia: Lena-Kol. (Lena River near the village of Rys in the [former] Kirensk District, Maya River, Nelkan). Endemic. Described from the Maya River. Type in Leningrad.

Note. The labels do not provide information concerning location. Regel described under the name *Alsine michauxii* two different plants, one from E. Siberia and the other from N. America, referring to them as α *erecta* Rgl. and β *cymosa*, respectively. The name "*Michauxii*" is unacceptable for this species since it would clash with *Minuartia michauxii* (Fenzl) Mattf.

26. *M. gracilipes* Kom. comb. n., descr. in Addenda V, p. 673. — *Alsine gracilipes* Kom. in Kom. and Alis., Opređ. rast. Dal'nevost. kr. I (1931) 495.

503 Perennial, densely tufted; stems numerous, very crowded; flowering stems very slender, 15–20 cm long, glabrous, simple or sparingly branched; sterile shoots densely leafy, with short internodes; leaves narrowly linear, ca. 10 mm long and 0.3–0.5 mm broad, glabrous, rather rigid, with a thick midrib, hence almost trigonous, and 2 lateral veins, acute; leafy fascicles borne in the leaf axils and on the sterile shoots; flowers few on the stem, rarely solitary; pedicels slender, filiform, 1.5–6 cm long; bracts small, lanceolate-linear, narrowly scarious-margined; sepals ovate, 5 mm long, 3-nerved, narrowly scarious-margined; petals white, 1.5 times as long as calyx; capsule ovoid, shorter than calyx. July.

Limestone outcrops. — Far East: Uss. Endemic. Described from near the village of Novo-Nikolaevka in the [former] Vladivostok District. Type in Leningrad.

27. *M. lineata* (C. A. M.) Bornm. in Beih. Bot. Ctrbl. XXVII, Abt. I (1910) 318; Mattf. in Beih. Repert. spec. nov. XV, 156. — *Arenaria lineata* C. A. M. in litt. ex Fenzl in Ldb. Fl. Ross. I (1842) 35 nom in syn. sub. *A. villarsii*. — *Alsine lineata* Boiss. Diagn. Pl. or. ser. I, 8 (1849) 100, nom in textu sub *A. villarsii* var. *stricta*. — *A. juniperina* ϵ *lineata* Boiss. Fl. Or. I (1867) 677; Voron. in Fom. and Voron., Opred. rast. Kavk. i Kryma, II, 2, 178. — *A. villarsii* β *psilosperma* Lus. 3. Fenzl in Ldb. Fl. Ross. I (1842) 350. — *M. biebersteinii* var. *lineata* Schischk. in Grossh., Fl. Kavk. II (1930) 392.

Perennial; taproot rather stout; sterile shoots rather short, densely leafy; flowering stems numerous, forming a loose tuft, ascending at base, 10–25 cm long, glabrous or in inflorescence glandular-pubescent (var. *glandulosa* Schischk.), with 1–4 leaf pairs; leaves of sterile shoots 1.5–3 cm long and ca. 1.5 mm broad, rigid, erect or slightly deflexed, glabrous, 3-veined, acute, with axillary fascicles; leaves of flowering shoots not more than 1–1.5 cm long; flowers 3–7 at the end of stem; pedicels glabrous or scarcely glandular-pubescent, equaling or 2–4 times as long as calyx; bracts lanceolate-linear, acute, herbaceous, inserted above middle of pedicel; sepals 5 mm long, acute, 3-nerved, glabrous or scarcely glandular-pubescent; petals 1.5 times as long as calyx; capsule oblong, 6–7 mm long; seeds ca. 1 mm long, striate-rugose, destitute of sharp tubercles. May–July.

Rocks and stony slopes, up to 3,000 m. — Caucasus: E. and S. Transc., Tal. **Gen. distr.:** N. Iran. Described from Gilan and Talysh. Type in Leningrad.

28. *M. taurica* (Stev.) Asch. et Graebn. Synops. V, 1 (1918) 758 et Hauptreg. d. V Band 1 Abth., 113; Schischk. in Journ. of the Gouvern. bot. Gard. Nikita X, 2 (1928) 37. — *Alsine taurica* Stev. in Bull. Soc. Nat. Mosc. XXIX, 1 (1856) 319. — *A. villarsii* δ *psilosperma* Lus. I Fenzl in Ldb. Fl. Ross. I (1842) 126. — *A. villarsii* var. *taurica* Gürke, in Richter-Gürke, Pl. Europ. II (1899) 260. — *A. juniperina* Shmal'g., Fl. I, 150, non Fenzl. — *A. juniperina* var. *lineata* Zelen., Mat. dlya Fl. Kryma (1906) 218, non Boiss. — *Minuartia juniperina* var. *taurica* Woron. in Fom. and Voron., Opred. rast. Kavk. i Kryma II, 2 (1914) 179. — *M. lineata* Mattf. in Beih. Repert. spec. nov. XV, 156, ex parte, non Bornm.

Perennial; stems numerous, crowded, 3–18 (15) cm long, glandular-pubescent, 1–5-flowered; leaves 3-veined, glandular-pilose, 5–10 mm long, 1 mm broad, ascending or sometimes horizontally spreading; pedicels 2–4 times as long as calyx; bracts lance-ovate, 3-nerved; sepals 3-nerved, 4.5–5 mm long; petals obovate, twice as long as calyx; capsule mostly somewhat shorter than calyx; seeds small, 0.75 mm in diameter, very slightly tuberculate on the back, smooth elsewhere. June–July. (Plate XXVIII, Figure 7).

Rocks and stony slopes in the subalpine zone. — European part: Crim. (throughout the Yaila). Endemic. Described from the Crimea (Mt. Karachag). Type in Leningrad.

Note. A species endemic for the Crimean mountains, resembling *M. lineata* (C. A. Mey.) Bornm., a species distributed in E. Transcaucasia and Iran, but it differs from the latter in having shorter stems and leaves as well as a more profuse glandular indument.

29. *M. litwinowii* Schischk. sp. nova in Addenda V, p. 673. — *Alsine aucheriana* var. *glandulosa* Litw. in Trav. Mus. bot. Ac. Sc. Pétersb. III (1907) 106.

Perennial; stems woody at base; sterile shoots numerous; flowers stems 4–10 cm long, glandular-pilose as are the leaves; sterile shoots densely leafy, with short internodes; leaves linear, 4–5 mm long and 0.5–2 mm broad, 3-veined, acute to subobtusate, the lower marcescent; flowers 1–3 on the stem; pedicels glandular-pubescent, 2–10 mm long; bracts ovate, acute, herbaceous; sepals lanceolate, 5–6.5 mm long, acute or acuminate, 3-nerved, glandular-pubescent, narrowly scarious-margined, sometimes very faintly colored at tips; petals 1.5 times as long as calyx; capsule oblong, equalling calyx. July.

Rocks and stony slopes. — Centr. Asia: Mtn. Turkm., Pam.-Al., T. Sh. (Karatau). **Gen. distr.:** Arm.-Kurd., Iran. Described from Turkmenia (Kopet Dagh). Type in Geneva.

Section 6. **POLYMECHANA** Mattf. in Engl. Bot. Jahrb. LXII Beibl. 126 (1921) 32, nomen; in Beih. Repert. spec. nov. XV (1922) 169. — Calyx nonindurative; sepals 3-nerved, acute, spreading at anthesis; petals rounded-ovate to ovate, abruptly narrowing to a short claw, as long as or slightly longer than calyx.

- 505 30. *M. verna* (L.) Hiern. in Journ. of Bot. XXXVII (1899) 320; Mattf. in Beih. Repert. Spec. nov. XV, 170; Kryl., Fl. Zap. Sib. V, 1022. — *Arenaria verna* L. Mant. I (1767) 72. — *A. villosa* Ldb. in Mém. de l'Acad. St.-Pétersb. V (1815) 534. — *A. marginata* M. B. ex Schlecht. in Berl. Mag. Naturf. Freunde VII (1816) 212. — *A. paniculata* Bge. in Ldb. Fl. Alt. II (1830) 168. — *A. costata* Bge., l. c. (1830) 170. — *Alsine verna* Wahlb. Fl. Lapp. (1812) 129; Fenzl in Ldb. Fl. Ross. I, 347, ex parte; Turcz. Fl. baic.-Dahur. I, 220; Kom., Fl. Kamch. II, 20. — *A. marginata* Fenzl, Verbr. Als. (1833) tab. ad p. 18. — *A. paniculata* Fenzl, l. c. (1833) tab. ad p. 37. — *A. costata* Fenzl, l. c. — Ic.: Ldb. Icon. pl. Fl. Ross. V, t. 417. — Exs.: HFR no. 1209.

Perennial; stems numerous, woody in lower part, much branched, giving rise to annual flowering branches and sterile shoots and together forming a dense tuft; bearing remnants of dead leaves, procumbent; flowering branches erect, commonly glandular-pubescent, 3–8 cm long; sterile shoots short, densely leafy; leaves narrowly linear to almost subulate, glandular-pilose, more rarely glabrous, 5–12 mm long and 3/4–1 mm broad, very prominently 3-veined beneath, the cauline 2–5 pairs; flowers 1–3 at the end of stem, forming a loose cyme; sepals ovate, short-acuminate, narrowly scarious-margined, prominently 3-nerved, the curvature of the lateral nerves parallel to that of the margin, mostly glandular-pubescent, more rarely glabrous, ca. 3 mm long; petals equalling to one and a quarter times as long as calyx, rounded-ovate to ovate, abruptly narrowing to a short claw; capsule slightly exceeding calyx; seeds oblong, finely sharp-tubercled, 2/3–3/4 mm in diameter. July–August.

Rock crevices, glacial moraines, gravelly mountain slopes, and moss- and-lichen and stony tundras in both the arctic and alpine zones. — Arctic:

all regions; Caucasus: Gr. Cauc.; W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Okh., Kamch.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** Scand., Centr. Eur., N. Mong., Dzu.-Kash., N. Am. Described from southern European Alps. Type in London.

Note. *M. verna* is an aggregate species, composed of many races. It is not yet possible, however, to map out properly the distribution of the various races occurring on Soviet territory. In 1815 Ledebour described *Arenaria villosa* from the Far East, a plant belonging to the aggregate species *M. verna*. In 1816 Schlechtendal (l. c.) presented *Arenaria marginata* M. B. from E. Siberia and M. Bieberstein designated it as a new species. In 1830 Bunge described two species from Altai: *Arenaria paniculata* Bge. from the Chulyshman Valley and *A. costata* from the mountains of central and western Altai. In 1868 Ruprecht described a variety from the Caucasus under the name *Alsine rubella* β *caucasica* Rupr. In fact, *Minuartia verna* (L.) Hiern. displays great variability over immense areas of the USSR and grows in a wide range of ecological conditions such as the alpine zone, the Arctic region, and mountain steppes. The variability finds expression in seed characters, fruit size, and type of indument. A thorough study of available material relating to the aggregate species *Minuartia verna* (L.) Hiern. would take a long time and, in view of the strict timetable established for publication of successive volumes of the Flora, it cannot be contemplated. The West European races have been reviewed in great detail by Hayek (in Oesterr. bot. Zeitschr. LXXI (1922), p. 89–116). He reports for Europe six races which he designates as subspecies. An attempt to break up into varieties *Alsine verna* growing on the territory of Russia was made by Fenzl (Ldb. Fl. Ross. I, p. 347–350) and later by Regel (Bull. Soc. Nat. Mosc. XXXV, I (1862) 218–227).

31. *M. rubella* (Whlb.) Graebn. in Aschers. u. Graebn. Synops. V, 1 (1918) 733. — *Alsine rubella* Whlb. Fl. Lappon. (1812) 128. — *Arenaria rubella* Hook. in Curtis, Fl. Londin. (1828) tab. 203. — *Alsine verna* ν *glacialis* Fenzl in Ldb. Fl. Ross. I (1841) 350. — *Arenaria quadri-valvis* R. Br. in Parry's I Voy. App. (1824) 271. — Ic.: Wahlenb., l. c., t. 6.

Perennial, densely tufted; stems very slightly weedy and profusely branched in lower part, 3–7 cm long, the sterile shoots densely leafy, the flowering ones with few leaf pairs; herbaceous stems more or less glandular-pubescent; radical leaves linear-subulate, subobtuse, 4–7 mm long, 0.3–0.6 mm broad, glabrous or diffusely glandular-pubescent, 3-nerved beneath; leaves of flowering shoots smaller; flowers solitary or several at the ends of stems; pedicels glandular-pubescent, 2–15 mm long; sepals lanceolate to ovate-lanceolate, 3–4 mm long, acute, distinctly 3-nerved, commonly glandular-pubescent and reddish-tinged; petals white, shorter than to as long as calyx, broad-ovate, abruptly narrowing to a short claw; capsule 1.5 times as long as calyx; seeds reniform, glabrous, ca. 0.5 mm long. July–August. (Plate XXVII, Figure 9).

Stony tundra and sandy shores in the Arctic region. — Arctic: Arc. Eur., Nov. Z., Arc. Sib., Chuk. **Gen. distr.:** Arc. Am., Greenland. Described from Lapland.

32. *M. orthotrichoides* Schischk. sp. nova in Addenda V, p. 674. — *Arenaria hirta* var. *glabrata* Cham. et Schlecht. in Linnaea I (1826) 56, ex parte. — *A. glabrata* Cham. et Schlecht. ex Mattf. im Beihefte z. Repert. spec. nov. XV (1922) 171 nom., partim.

507 Perennial, densely tufted; stems numerous, not more than 1–2 cm long, glabrate, subimbricately leafy in lower part; leaves linear, acute, 5–6 mm long and 0.6–0.8 mm broad, glabrous or at margin slightly ciliate; flowers solitary, glabrate pedicels 3–4 mm long, scarcely rising above the tuft; sepals ovate-lanceolate, 3 mm long, 3-nerved, glabrous; petals broad-ovate, abruptly narrowing at base to a short claw, shorter than to nearly as long as calyx. August.

Shores of the Arctic Ocean. — Arctic: Arc. Sib. (Lyakhov Island), Chuk. (Lavrentiya Bay). Endemic. Described from Lavrentiya Bay. Type in Leningrad.

Note. It has been impossible to adopt the name of the variety *glabrata* Cham. et Schlecht. as a specific name since Chamisso and Schlechtendal referred under this name to two different plants: one from Asia, which indeed corresponds to our species; the other from Kamchatka, belonging to *Minuartia verna* s.l. In Mattfeld's monograph (l. c.) one meets the name "*Arenaria glabrata*" Cham. et Schlecht., but the authorities cited did not mention any such specific name and merely established a variety.

Section 7. **ALSINANTHE** Fenzl in Endl. Gen. pl. (1840) 965; in Ldb. Fl. Ross. I, 356; Rchb. Repert. Herb. (1841) 205, pro gen., nomen. — *alsinanthus* Rchb. Handb. (1837) 298, pro gen. non Desv. — *Alsine* sect. *Alsinanthae* Rouy et Foucaud, Fl. Fr. III (1896) 265. — Sepals acute or acuminate, 3-nerved, at anthesis; petals shorter than sepals. Glabrous perennial plants with 1-veined leaves.

33. *M. stricta* (Sw.) Hiern. Journ. of Bot. XXXVII (1899) 320; Mattf. in Beih. Repert. Sp. nov. XV, 174; Kryl., Fl. Zap. Sib. V, 1025. — *Spergula stricta* Sw. Vetensk. Acad. Handl. Stockh. XX (1799) 227. — *Alsine stricta* Wahlb. Fl. Lapp. (1812) 127; Fenzl in Ldb. Fl. Ross. I, 357; Turcz. Fl. baic.-dahur. I, 221; Kom., Fl. Kamch. II, 100. — *Arenaria uliginosa* Schlecht. ex DC. in Lam. et DC. Fl. Franc. IV (1805) 786. — *A. baicalensis* Steud. Nomencl. ed. 2, 1 (1840) 127. — *A. lapponica* Spreng. Syst. II (1825) 402. — *A. stricta* Wats. Bibliog. Ind. (1878) 98. — *Sabulina stricta* Rchb. Fl. Germ. excurs. (1832) 789. — *Alsinella stricta* Sw. Summa Veg. Scand. (1814) 17. — *Stellaria stricta* Sw. ex Steud., l. c. (1840) 637. — *Alsinanthe stricta* Rchb. Ic. Fl. Germ. V (1842) tab. 209, fig. 4935. — Ic.: Rchb., l. c. (1842).

Perennial, quite glabrous throughout; stems erect, 10–20 cm long; leaves narrowly linear, 5–10 mm long and 0.5–1 mm broad, obtuse, sessile, obscurely veined, with leafy fascicles in their axils; flowers 2–4 in a loose inflorescence at the ends of stems; pedicels 2–6 cm long, filiform; sepals ovate or elliptic, 1.5–3 mm long, acuminate, 3-nerved; petals as long as or scarcely longer than sepals, oblong, obtuse or rounded at apex; capsule

ovoid, slightly exceeding calyx; seeds rugose, 0.6–0.75 mm in diameter. June–August. (Plate XXVIII, Figure 1).

508

Damp and boggy meadows; also banks of streams. — Arctic: Arc. Eur., Arc. Sib., Chuk., An.; European part: Kar.-Lap., N. Urals; W. Siberia: Ob, Alt.; E. Siberia: Yenisei, Ang.-Say, Dau., Lena-Kol.; Far East: Okh.

Gen. distr.: N. and Centr. Eur., British Isles, Arc. Am., Greenland. Described from Scandinavia. Type in Stockholm.

Note. Seeds of this species have been found in elluvial deposits in Saxony.

34. *M. elegans* (Cham. et Schlecht.) Schischk. comb. nova. — *Arenaria elegans* Cham. et Schlecht. in *Linnaea* I (1826) 57. — *Alsine rossii* Fenzl, Verbr. Als. (1833) tab. ad p. 18. — *A. rossii* α *corollina* Fenzl in Ldb. Fl. Ross. I (1842) 356. — *A. elegans* Fenzl, Verbr. Als. (1833) tab. ad p. 18. — *Minuartia rossii* Mattf. in Beih. Repert. spec. nov. XV (1922) 177 quo ad pl. sibir.

Perennial, loosely tufted, quite glabrous throughout; stems profusely branched at base, densely leafy, 3–7 cm long; leaves trigonous-subulate, fleshy, obtuse, 3 mm long and 0.75 mm broad, with small-leaved fascicles in the axils; flowers solitary at the ends of stems and in the axils of upper leaves; pedicels filiform, 8–12 mm long; sepals ovate, 2 mm long, acutish, subcarinate at base, obscurely 3-nerved; petals obovate or oblong-cuneate, very slightly shorter to somewhat longer than calyx; capsule ovoid-globular, about equaling calyx; seeds reniform, patterned-rugose, black. July.

Tundras. — Arctic: Chuk. Endemic. Described from the shores of Lavrentiya Bay. Type in Berlin; cotype in Leningrad.

35. *M. pusilla* Schischk. sp. nova in Addenda V, p. 674.

Perennial, glabrous throughout; stems numerous, crowded in a dense tuft 2–3 cm high; leaves narrowly linear, 3–6 mm long, 0.6–0.8 mm broad, subobtuse, 1-veined, crowded in the lower part of stems, usually with leafy axillary fascicles; flowers solitary at the ends of stems; pedicels 1–2 cm long; sepals ovate, 3-nerved, acute or acutish, 2.5 mm long; petals narrow-ovate, shorter than calyx, tapering toward base, obtuse at apex; capsule slightly exceeding calyx, dehiscing nearly to base by 3 valves; seeds reniform, 0.7–0.8 mm long, reddish-brown, lustrous. July–August.

River pebbles. — Centr. Asia: T. Sh. Endemic. Described from plants collected by Sapozhnikov in the Kogalyachan River valley (23 July, 1913). Type in Leningrad.

Section 8. **SPECTABILES** Fenzl in Endl. Gen. (1840) 965; Mattf. in Beih. Repert. spec. nov. XV, 180. — *Wierzbickia* Richb. Nomencl. (1841) 205, nom. pro gen.; Deutschl. Fl. III (1842) 91. — Calyx cylindric; sepals linear, obtuse, erect at anthesis; staminal glands of outer series globose or very slightly notched at apex; leaves flat or scarcely subterete; seed margin not pectinate.

509

Series 1. **Caucasicae** Mattf. in Engl. Bot. Jahrb. LXII, Beibl. 126 (1921) 32. — Leaves at the tips of sterile shoots densely rosulate, 3–5-nerved at base.

36. *M. aizoides* (Boiss.) Bornm. in Beih. bot. Centralbl. XXXI, Abt. II (1914) 193; Voron. in Fom. and Voron., Opred. rast. Kavk. II, 2 (1914) 180. — *Alsine aizoides* Boiss. Diagn. pl. or. ser. I, 1 (1842) 47; Fl. Or. I, 672; Rupr. Fl. cauc. 205. —

Perennial, densely tufted; stems 5–12 cm long, glandular-pilose, with long sterile shoots at base; leaves short-lanceolate, 5–10 mm long and 0.5–1 mm broad, commonly 5-veined; with antrorsely ciliate margin, the axillary fascicles not surpassing the subtending leaves; flowers commonly solitary or else 2 or 3; pedicels slightly longer than calyx; sepals ovate-oblong, 4 mm long, glandular-pubescent, obtuse, obscurely 3-nerved; petals oblong, as long as or scarcely longer than calyx; capsule cylindric, 1.5 times as long as calyx; seeds smooth-margined. June–August.

Gravelly slopes and rocks in the alpine zone, at altitudes of 2,000–3,400 m. — Caucasus: Main Range, Dag., E., W., and S. Transc. Gen. distr.: As. Min., Arm.-Kurd., Iran (Salaran). Described from the mountains of Armenia. Type in Geneva.

37. *M. caucasica* (Ad.) Mattf. in Asch. et Gr. Synops. V, 1 (1919) 941; Mattf. in Beih. Repert. spec. nov. XV (1922) 184. — *Arenaria caucasica* Ad. ex Fenzl in Ldb. Fl. Ross. I (1842) 354, in syn. — *A. pinifolia* M. B. Fl. taur.-cauc. I (1808) 348. — *A. laricifolia* M. B. l. c. 347, non L. — *Alsine pinifolia* Fenzl Verbr. Alsin. tab. ad p. 46 (1833) et in Ldb. Fl. Ross. I, 354; Shmal'g., Fl. I, 151. — *Alsine caucasica* Rupr. Fl. cauc. I (1860) 203, non Boiss. (1853). — *A. ciliata* Schmalh. in Ber. d. Deutsch. Bot. Gesellsch. X (1892) 287, ex parte. — *Minuartia pinifolia* Hand.-Mazz. in Ann. K. K. Hofm. Wien, XXVI (1912) 147; Voron. in Fom. and Voron., Opred. rast. Kavk. i Kryma II, 2 α (1914) 181. — *M. ciliata* Woron., l. c. (1914) 179.

510 Perennial: stems numerous, forming a dense tuft; sterile shoots short, densely leafy; flowering stems 5–15 cm long, glabrous at base, glandular-pubescent above; radical leaves narrowly linear, 2–3 cm long and 0.5–0.75 mm broad, slightly recurved or straight, acute, 3-nerved, the margin ciliolate; cauline leaves resembling the radical but shorter, usually much shorter than internodes; flowers several at the ends of stems; pedicels glandular-pubescent, shorter than calyx; sepals obtuse, 3-nerved, 6–7 mm long, narrowly scarious-margined; petals white, 1.5–2 times as long as calyx. June–September. (Plate XXVIII, Figure 2.)

Rocks, stony slopes in the alpine zone, and glacial moraines. — Caucasus: Main Range, mountains of W., S., and E. Transc. Gen. distr.: Pontic Range. Described from the Caucasus (Main Range). Type in Leningrad.

Note. This plant has a very complicated and confused synonymy. It was first known in the literature under the name *Arenaria pinifolia*. The authority responsible for establishment of this species was thought to be Marschal von Bieberstein. It appears, however, that the epithet *pinifolia* was applied in Bieberstein's herbarium to a plant that has nothing in common with the Caucasian species and its proper place is among synonyms of *Minuartia capillacea* (All.) Graebn. The first Russian authority to take note of this plant was Ruprecht (l. c.). Considering the deviation displayed by the plant occurring in the Caucasus, he proposed that it be renamed *Alsine caucasica* (Adams). This name was published for the first time by Fenzl in Ldb. Fl. Ross. (1842) as *nomen nudum*.



PLATE XXVIII. 1. *Minuartia stricta* (Sw.) Hiern., flower. — 2. *M. caucasica* (Ad.) Mattf. — 3. *M. macrocarpa* (Pursh) Ostenf., seed. — 4. *M. broterana* (Trautv.) Woron. — 5. *M. arctica* (Stev.) Asch. et Gr. — 6. *M. biflora* (L.) Schinz et Thell., flower. — 7. *M. taurica* (Stev.) Asch. et Gr., flower. — 8. *M. laricina* (L.) Mattf., seed.

However, when restoring the name coined by Adams, Ruprecht (in 1869) was unaware of the fact that Boissier, in 1853, had described an entirely different plant under the appellation *Alsine caucasica*. As regards *Alsine ciliata* described from the alps of Ossetia, we have been able to ascertain, by examining Schmalhausen's authentic specimens, that this species incorporates two different plants, namely *Alsine pinifolia* and *A. imbricata* (M. B.) C. A. M., and this fact is reflected in their respective descriptions. The confusion indicated has made it impossible to reinstate Schmalhausen's name, the more so since the accompanying illustration was based on *M. imbricata* (M. B.) C. A. M.

This plant has been reported by various authorities for the Crimean Yaila. Fenzl (l. c.) was first to record it for the Crimea by virtue of a specimen collected by Parreys and he set it up as var. *eglandulosa* Fenzl. We have unfortunately not had the opportunity to examine Parreys' specimen. Goldie's reports could not be confirmed since the samples identified by him as *Alsine pinifolia* have been found to belong to another species. No specimen of *M. caucasica* from the Crimea could be detected in the Herbarium of the Botanical Institute of the Academy of Sciences, in the Nikitskii Botanical Garden, or in Tiflis. In our opinion, *M. caucasica* is unlikely to be discovered in the Crimea and we have therefore refrained from including this species in the Crimean flora.

Series 2. *Laricinae* Mattf. in Engl. Bot. Jahrb. LXII, Beibl. 126 (1921)

33. — Leaves lanceolate-linear, covered in lower part or throughout with long hairs; seeds fimbriate-pectinate on the back.

- 513 38. *M. laricina* (L.) Mattf. in Engl. Bot. Jahrb. LXII Beibl. 126 (1921) 33 et in Beihefte z. Repert. spec. nov. XV (1922). — *Spergula laricina* L. Sp. pl. (1753) 441. — *Alsine laricina* Grantz, Instit. II (1766) 408; Fenzl in Ldb. Fl. Ross. I, 352; Turcz. Fl. baic.-dahur. Add. p. 12; Kom., Fl. Manchzh. II, 186. — *A. pilifera* Turcz. Fl. baic.-dahur. I (1842) 217. — *A. verna* var. *borealis* Rgl. in Bull. Soc. Nat. Mosc. (1859) 28. — *Arenaria laricina* Cham. et Schlecht. in Linnaea I (1826) 57.

Perennial, prostrate and branched at base; stems ascending, simple, glabrous, 10–20 cm long; leaves linear-subulate, rigid, 8–15 mm long and 0.5–1 mm broad, acute to subobtuse, 1-veined, sparsely long-ciliate on the margin and at base, with axillary fascicles; flowers in compact 1–5-flowered terminal cymes; sepals broad-linear, obtuse, 5 mm long, scarious-margined, 3-nerved; petals obovate-oblong, 1.5–2 times as long as calyx; capsule cylindric-conical, 1.5–2 times as long as of calyx; seeds disciform, fimbriate-pectinate on the margin. July–August. (Plate XXVIII, Figure 8.)

Rocks, stony and sandy slopes, pine forests, shrub thickets, and taluses. — E. Siberia: Dau., Lena-Kol.; Far East: Ze.-Bu., Uss., Okh. Gen. distr.: Manchuria, N. Korea. Described from Siberia. Type in London.

39. *M. macrocarpa* (Pursh) Ostenf. in Meddel. om Grönl. XXXVII (1920) 225; Mattf. in Beih. Repert. spec. nov. XV, 195; Kryl., Fl. Zap. Sib. V, 1024. — *Arenaria macrocarpa* Pursh, Fl. Bor. Am. I (1814) 318. — *Alsine macrocarpa* Fenzl, Verbr. Alsin. (1833) tab. ad p. 18; Fenzl, in Ldb. Fl. Ross. I, 353; Kom., Fl. Kamch. II, 98; Hultén, Fl. of Kamtch. II, 80. — Ic.: Hultén l. c. fig. 9a.

Perennial, densely tufted; stems profusely branched from base, with rather short densely leafy sterile shoots and prostrate glandular-pubescent flowering stems 2–6 cm long; leaves linear, 5–12 mm long and 1–2 mm broad, subobtusely, 3-veined, almost flat, pubescent beneath, dentate-ciliate, the cilia 3–5-cellular; flowers solitary, on glandular-pubescent pedicels 5–13 mm long; sepals linear-oblong, 5–7 mm long and 2–2.5 mm broad, obtuse, glandular-pubescent; petals obovate, 1.5–2 times as long as calyx, rarely slightly exceeding calyx (var. *minutiflora* Hultén); capsule oblong, 2–2.5 times as long as calyx; seeds disciform, 2–2.5 mm long, the margin fimbriately long-ciliate. July–August. (Plate XXVIII, Figure 3.)

Dry tundras and sandy or meadowy slopes of gullies and shores in the Arctic and occasionally the alpine zone. — Arctic: Nov. Z., Polar Urals, Arc. Sib., Chuk., An. (Gizhiga); E. Siberia: Dau. (Sokhondo); Far East: Kamch. **Gen. distr.:** Ber., Arc. Am., Alaska. Described from Arctic America.

- 514 40. *M. imbricata* (M. B.) Woron. in *Opred. rast. Kavk. i Kryma* II, 2 (1914) 179; *Mattf. in Beih. Repert. spec. nov.* XV (1922) 196. — *Arenaria imbricata* M. B. *Fl. taur.-cauc.* I (1808) 344. — *Alsine imbricata* C. A. M. *Verzeichn. Pfl. Cauc.* (1831) 217; Fenzl in *Ldb. Fl. Ross.* I, 352; Boiss. *Fl. Or.* I, 672. — *Alsine inamoena* C. A. M. *Verzeichn. Pfl. cauc.* (1831) 218. — *A. imbricata* var. *inamoena* Boiss. *Fl. Or.* I (1867) 673; Rupr. *Fl. Cauc.* I (1869) 207. — *A. ciliata* Schmalh. in *Ber. d. Deutsch. bot. Ges.*, X (1892) 287, ex parte. — *Ic.*: Schmalh. l. c. tab. XVII, 1–5.

Perennial, densely tufted; stems 5–10 cm long, covered with stiff spreading hairs, sometimes with long sterile shoots at base; leaves linear, 5–7 mm long and ca. 1 mm broad, 1-veined, acute, the margin densely beset with cilia equalling or exceeding breadth of blade, the axillary fascicles not surpassing the leaf; flowers commonly solitary; pedicels as long as or longer than calyx; sepals linear-oblong, twice as long as calyx; capsule conical, 1.5–2 times as long as calyx; seeds disciform, flat, with pectinately long-fringed margin. June–August.

Rocks and stony slopes in the alpine zone, glacial moraines and taluses at altitudes between 2,000 and 3,000 m; rarely on shaded rocks near the timberline. — Caucasus: Main Range, E. and S. Transc. **Gen. distr.:** Arm. Kurd. Described from the Main Caucasus Range. Type in Leningrad.

41. *M. rhodocalyx* (Alb.) Woron. in *Fom. and Voron., Opred. rast. Kavk. i Kryma* II, 2 (1914) 180; Grossg., *Fl. Kavk.* II, 394. — *Alsine rhodocalyx* Alb. in *Bull. Herb. Boiss.* II, 4 (1894) 255. — *M. imbricata* *Mattf. in Beih. Repert. spec. nov.* XV, 196, ex parte. — *Ic.*: Alb. l. c., tab. XIII.

Perennial, loosely tufted; stem glabrous, only at the very summit glandular; leaves linear, 5–12 mm long and ca. 1 mm broad, glabrous, long-ciliate in lower part, 1-veined or at base 3-veined, with axillary leaf fascicles; flowers solitary or in pairs at the end of stem; pedicels 2–3 times as long as or more rarely equalling calyx, covered with spreading glandular violet-tinged hairs; sepals ovate, 5 mm long, obscurely 3-nerved, obtuse, glandular-pubescent, often violet-tinged like the pedicels; petals white, 1.5–2 times as long as calyx; seeds disciform, with fimbriate-pectinate margin. August–September.

Rocks, often calcareous, in the alpine zone and glacial moraines, at altitudes between 2,700 and 3,000 m. — Caucasus: W. part of the Main Range (Mt. Fisht, Gagry Massif — Abrinka-Khvatsyrkha Pass, Bol'shoi Urushtenskii Glacier). Endemic. Described from Mt. Fisht. Type in Geneva; cotype in Leningrad.

- 515 42. *M. brotherana* Woron. In Opred. rast. Kavk. i Kryma II, 2 (1914) 179. — *Stellaria brotherana* Trautv. Incr. Fl. Ross. I. (1882) 129. — *Arenaria brotherana* Trautv. l. c. (1882) 127 et in A. H. P. VIII (1883) 151; Boiss. Suppl. 115; Williams, Revis. Aren. 375; Voron. in Fom. and Voron., Opred., l. c., 181.

Perennial, forming rather small dense pulvinate mats; sterile shoots prostrate; flowering stems ascending, pubescent, 1–4 cm long; leaves imbricated, oval, ca. 3 mm long and 1–1.5 mm broad, pubescent, with long-ciliate margins, obtuse, flat above, convex and without perceptible veins beneath; flowers, solitary, terminal, subsessile; sepals oblong, ca. 3 mm long, obscurely 3-nerved, dilated in lower part; petals oblong-spatulate, 1.5 times as long as calyx; capsule oblong, about twice as long as calyx; seeds ca. 1 mm long, with pectinate-ciliate margin. August (Plate XXVIII, Figure 4.)

Glacial moraines at about 3,000 m. — Caucasus: Gr. Cauc., at the Mamison Glacier, Gezevtsik, sources of the Rion River at Gurshevi. Endemic. Described from the Main Caucasus Range (Mamison Glacier). Type in Leningrad.

Series 3. *Biflorae* Mattf. in Engl. Bot. Jahrb. LXII, Beibl. 126 (1921) 33. — Leaves linear-subulate, covered with short hairs; seeds smooth or finely rugulose, not pectinate-ciliate.

43. *M. arctica* (Stev.) Asch. et Gr. Synops. V, 1 (1918) 772; Mattf. in Beih. Repert. spec. nov. XV, 199; Kryl., Fl. Zap. Sib. V, 1023. — *Arenaria arctica* Stev. ex Ser. in DC. Prodr. I (1824) 404. — *A. muscorum* Fisch. in DC. l. c. (1824) 409. — *Alsine arctica* Fenzl, Verbr. d. Als. tab. ad p. 18 (1833); in Ldb. Fl. Ross. I, 355; Turcz. Fl. baic.-dahur. I, 218.

Perennial, the flowering stems and sterile shoots forming dense tufts; flowering stems 5–9 cm long, simple, glandular-pubescent, commonly 1- or more rarely 2-flowered; leaves glabrous, more rarely sparsely covered with short glandular hairs, on sterile shoots narrowly linear, convex and veinless beneath, 6–16 mm long and $\frac{2}{3}$ – $1\frac{1}{4}$ mm broad, the upper cauline shorter and broader, obtuse; sepals oblong-linear to oblong-ovate, obtuse, 3-nerved, glandular-pubescent, often purple-tinged, 5–7 mm long; petals about twice as long as calyx; capsule 1.5–2 times as long as calyx; seeds reniform, bluntly tuberculate, 1–1.5 mm in diameter. July–August. (Plate XXVIII, Figure 5.)

Stony tundra, waterside slopes, rocks, and rock streams in the alpine and Arctic zones. — Arctic: Arc. Eur. (?), Nov. Z. (?), N. Urals, Arc. Sib., Chuk., An. (Gizhiga); W. Siberia: Alt., Ang.-Say., Dau.; Far East: Kamch., Sakh.; Centr. Asia: Tarb. Gen. distr.: N. Mong., N. Am., Ber. Described from Arctic Siberia. Type in Geneva.

44. *M. biflora* (L.) Schinz et Thell. in Bull. Herb. Boiss. 2 sér. VII (1907) 407; Mattf. in Beih. Repert. spec. nov. XV, 201; Kryl., Fl. Zap. Sib. V, 1027; Hultén, Fl. Kamtch, II, 79. — *Stellaria biflora* L. Sp. pl. (1753) 422. — *Cerastium biflorum* Crantz, Inst. II (1766) 402. — *Alsine biflora* Wahlb. Fl. Lapp. (1812) 128; Fenzl in Ldb. Fl. Ross. I, 355. — *A. biflora* β *carnosula* Fenzl in Ldb. Fl. Ross. I (1842) 356; Kom., Fl. Kamch. II, 99. — *Alsinella biflora* Swartz, Summ. Veg. Scand. (1841) 17. — *Arenaria sajanensis* Willd. in Schlecht. Berl. Gesell. Nat. Fr. Mag. VII (1816) 200. — *A. polygonoides* β *occulta* Ser. in DC. Prodr. I (1824) 408. — *A. occulta* Fisch. ex Ser. in DC., l. c. (1824), nom. — *A. scandinavica* Spreng., Syst. II (1825) 402. — *Sabulina biflora* Rchb. Fl. germ. excurs. (1832) 790. — *A. stenopetala* Turcz. in Bull. Soc. Nat. Mosc. (1838) 39, nom. nud. — *Alsina occulta* Fisch. ex Turcz. Fl. baic.-dahur. I (1842) 219. — *Alsinanthe biflora* Rchb. Ic. Fl. Germ. V (1842) t. 202, f. 4939. — *Alsinopsis sajanensis* Cockerell Am. Nat. XI (1906) 864. — Ic.: Rchb. Ic. Fl. germ. t. 202, f. 4939.

Perennial; stems erect, 3–7 cm long; leaves narrowly linear, 6–10 mm long and 0.5–1 mm broad, acute, convex or bluntly keeled and veinless beneath, glabrous except for short cilia at base, the cauline shorter and broader; flowers 1–3 at ends of stems; pedicels 2–12 mm long; sepals oblong-ovate, obtuse, 3-nerved, covered with short glandular hairs, 3–4 mm long; petals oblong, as long as or slightly longer than calyx, very rarely up to 1.5 times as long; capsule 1.5 times as long as calyx; seeds globular-reniform, smooth or slightly rugulose, $2/3$ – $3/4$ mm in diameter. June–August. (Plate XXVIII, Figure 6).

Rocks, stony slopes, and meadows in the Arctic and alpine zones. — Arctic: Arc. Eur., Nov. Z., Arc. Sib., Chuk., An. (?); European part: N. Urals (Kosvinskii Kamen); W. Siberia: Alt.; E. Siberia: Ang.-Say, Dau.; Far East: Kamch. (Anauna River); Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. (rarely). **Gen. distr.:** Arc. Scand., N. Finland, Arc. Am., Ber., Greenland, N. Mong. Described from Lapland alps. Type in London.

Genus 471. **AMMODENIA** * PATRIN **

Patrin ex J. G. Gmelin Fl. Sib. IV (1769) 160; Rupr. Beitr. Pfl. Russ. Reichs II (1845) 225. — Honkenya Ehrh. Beitr. II (1788) 181. — *Halianthus* Fries, Fl. Hall. (1817) 75. — *Adenarium* Rafin. in Desv. Journ. phys. LXXXIX (1818) 249.

Flowers small, unisexual, the plants dioecious; sepals 5; petals 5; stamens 10; styles 3, rarely 4 or 5; capsule globose, subbaccate, fleshy, dehiscent by 3 valves. Herbaceous, glabrous, fleshy plants; leaves opposite, sessile, exstipulate.

1. *A. peplodes* (L.) Rupr. Fl. Samoied. Cisural. in Beitr. Pflzk. Russ. Reichs. II (1845) 25; Kom., Fl. Kamch. II, 97; Kom. and Alis., Opred. rast. Dal'nevost. kr. I, 495. — *Arenaria peplodes* L. Sp. pl. (1753) 423. — *Alsine peplodes* Crantz, Instit. II (1766) 406. — *Honkenya peplodes* Ehrh. Beitr. II (1788) 181; Fenzl in Ldb. Fl. Ross. I, 358; Shmal'g., Fl. I, 153; Kryl., Fl. Zap. Sib. V, 1028. — *Halianthus peplodes*

* From Greek *ammos*, sand, and *aden*, a gland, referring to the glandular structures of the flower.

** Treatment by S. G. Gorshkova.

Fries, Fl. Hall. (1817) 75. — *Arenarium peploides* Rafin. Am. Monthly Mag. (1818) 266. — *Minuartia peploides* Hiern. in Journ. of Bot. XXXVII (1899) 332. — Ic.: Rchb. Ic. Fl. Germ. V, 213, f. 3670; Hegi Ill. Fl. Mitt.-Eur. III, 404, f. 616, et t. 106 f. 10. — Exs.: HFR no. 308.

Perennial; stems sprawling, branched, occasionally erect, to 25 cm long; leaves ovate, lanceolate, or oblong, elongate (var. *oblongifolia* Fenzl), 9 mm–3 cm long and 4–15 mm broad, fleshy, subacute, more or less thickened; flowers solitary in leaf axils and in forks of stems, unisexual, dioecious; sepals oblong-ovate, acute, 5–7 mm long and 2 mm broad; petals white, obovate, with elongated claws, in staminate flowers as long as or longer than calyx, in pistillate shorter; pistil with ovoid ovary and 3 styles, in staminate flowers abortive; seeds large, rounded, more or less compressed, finely granular, blackish-brown. June–July. (Plate XXVI, Figure 1).

Moss-and-lichen tundra, riverbanks, and seashores. — Arctic: Arc. Eur., Arc. Sib.; European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., V.-Kama; Far East: Kamch., Uda, Uss., Sakh. **Gen. distr.:** Scand., Jap.-Ch. (N. part). Described from Europe (N. part). Type in London.

Genus 472. **ARENARIA*** L.**

L. Gen. pl. ed. 1 (1737) 133.

Petals and sepals 5; stamens 5 or 10; styles mostly 3, rarely 2 or 4; nectariferous disk more or less developed; capsule dehiscent by 6 apical teeth; seeds many or 1. Annual or perennial herbs, sometimes woody at base. Russian name: peschanka [from *pesok*, sand].

- | | |
|--|-----------------------------------|
| 1. Perennials | 2. |
| + Annuals or biennials | 34. |
| 2. Capsule 1-seeded; stamens 5, alternating with 5 staminodes (Zaisan District) | 28. <i>A. potaninii</i> Schischk. |
| + Capsule many-seeded | 3. |
| 3. Leaves narrowly linear or subulate | 4. |
| + Leaves orbicular, oval, or ovate | 30. |
| 4. Pedicels very short; flowers crowded in a compact terminal head ... | 5. |
| + Pedicels rather long; flowers in a loose inflorescence | 6. |
| 5. Bracts broad, terminating in long point; petals oblong-linear, 2–3 times as long as calyx (Transcaucasia) | 1. <i>A. dianthoides</i> Sm. |
| + Bracts subulate; petals obovate, slightly longer than calyx (Ukraine) ... | 2. <i>A. cephalotes</i> M. B. |
| 6. Flowering stems to 20 cm long; leaves 0.5–7 cm long; plants rather densely tufted, sometimes pulvinate | 7. |
| + Stems solitary or several, 20–50 cm long; leaves 7–20 cm long ... | 17. |
| 7. Axillary fascicles present | 27. <i>A. griffithii</i> Boiss. |
| + Axillary fascicles wanting | 8. |
| 8. Radical leaves 3–7 cm long; cauline 2–2.5 cm long | 9. |
| + Radical leaves 0.5–3 cm long; cauline 5–9 mm long | 11. |
| 9. Nectariferous glands absent (Caucasus) | 18. <i>A. lychnidea</i> M. B. |
| + Each of the 5 stamens with a gland at base (Siberia) | 10. |

* From Latin *arena*, sand.

** Treatment by B. I. Shishkin and O. E. Knorring.

10. Leaves of sterile shoots subobtuse or acute, not subulate-tipped; sepals 5–7 mm long 17. *A. formosa* Fisch.
+ Leaves of sterile shoots terminating in a subulate point; sepals 3.5–4 mm long 19. *A. capillaris* Poir.
11. Sepals obtuse (Far East) 22. *A. tschuktschorum* Rgl.
+ Sepals acute 12.
12. Pedicels and sepals glandular-pubescent 13.
+ Pedicels and sepals glabrous 14.
13. Radical leaves 5–6 mm long *A. ferganica* Schischk.
+ Radical leaves 1–3 cm long *A. meyeri* Fenzl.
14. Radical leaves 5–7 mm long 15.
+ Radical leaves 8–30 mm long 16.
15. Flowering stems 15–25 cm long; leaves spiny (Kopet Dagħ) 24. *A. insignis* Litw.
+ Flowering stems 5–8 cm long; leaves not spiny (Altai) 20. *A. mongolica* Schischk.
16. Radical leaves 8–12 mm long; cauline 5–10 mm long; sepals 2.5–3 mm long (Caucasus ?) 25. *A. ledebouriana* Fenzl.
+ Radical leaves 1.5–3 cm long; cauline 10–17 cm long; sepals ca. 4 mm long (Central Asia) 26. *A. paulsenii* Winkl.
17. Leaf sheaths 4–12 mm long 18.
+ Leaf sheaths 0.5–2 mm long 19.
18. Leaf sheaths 4–6 mm long; sepals 5–7 mm long; petals 7–12 mm long (E. Siberia) 16. *A. juncea* M. B.
+ Leaf sheaths 6–12 mm long; sepals 6–7 mm long; petals 15–17 mm long 15. *A. cucubaloides* Smith.
19. Sepals acute or acuminate or tapering to an obtuse point 20.
+ Sepals rounded at apex or obtuse 26.
20. Sepals 6–10 mm long (Caucasus) 21.
+ Sepals 3–5 mm long 23.
21. Pedicels glandular-pubescent 5. *A. szowitsii* Boiss.
+ Pedicels glabrous 22.
22. Stem scaberulous in lower part (S. Transc.) . . 6. *A. macrantha* Schischk.
+ Plants glabrous throughout (Dagestan) 4. *A. holostea* M. B.
23. Petals as long as or scarcely longer than calyx; inflorescence rather compact, ovoid (SW of Eur. part of the USSR) 8. *A. rigida* M. B.
+ Petals 1.5–2.5 times as long as calyx; inflorescence loose (Siberia and Caucasus) 24.
24. Sepals 3–3.5 mm long (Altai) 12. *A. asiatica* Schischk.
+ Sepals 3.5–5 mm long (Caucasus) 25.
25. Sepals abruptly drawn out into an obtuse tip; petals oblong-linear 14. *A. gypsophiloides* L.
+ Sepals acutish; petals spatulate 10. *A. graminea* C. A. M.
26. Glands 10, alternating with stamens; plants glandular-pubescent in the inflorescence, rarely glabrous (S. Transc.) . . 11. *A. steveniana* Boiss.
+ Glands 5, at the base of filaments; plants glabrous in the inflorescence, very rarely glandular-pubescent (European part, Siberia) 27.
27. Sepals ca. 2.5 mm long, prominently sharp-keeled 13. *A. longifolia* M. B.
+ Sepals 3–5 mm long, ecarinate or with a blunt keel 28.

28. Stems woody at base; sterile shoots elongated, in lower part with distant leaves 7. *A. koriniana* Fisch.
 + Stems herbaceous at base; sterile shoots short, the long leaves closely clustered 29.
 320 29. Stems 10–20 (25) cm long; radical leaves 3–7 cm long; sepals violet-tinged on the back (Arc. Sib.) 9. *A. polaris* Schischk.
 + Stems 20–40 cm long; radical leaves 8–20 cm long; sepals green 8. *A. graminifolia* Schrad.
 30 (3). Petals 1.25 or 1.50–2 times as long as calyx (Arctic) 31.
 + Petals shorter than or as long as calyx (Alpine zone of Cauc. and Central Asia) 33.
 31. Stems solitary, weak; leaves ovate-lanceolate, acute (Far East, Lena-Kol.) 31. *A. redowskii* Cham. et Schlecht.
 + Densely matted plants; leaves obtuse (Arc. Eur.) 32.
 32. Leaves obovate, obtuse, with ciliate margins; petals 2–2.5 times as long as calyx; stems and pedicels commonly heavily pubescent. 30. *A. pseudofrigida* (Ostenf. et Dahl) Juz.
 + Leaves oblanceolate or oblong, subacute, glabrous; petals as long as or scarcely longer than calyx; stems and pedicels often glabrous 29. *A. humifusa* Wahlb.
 33. Calyx 3–4 mm long; stems with pubescence confined to one side of internodes; pedicels glabrous (Central Asia) 33. *A. turkestanica* Schischk.
 + Calyx 2.5–3 mm long; stems usually pubescent all round; pedicels mostly hairy (Caucasus) 32. *A. rotundifolia* M. B.
 34. (1). Calyx ca. 2 mm long; capsule scarcely enlarged at base 35. *A. leptoclados* Guss.
 + Calyx ca. 3 mm long; capsule markedly enlarged at base 34. *A. serpyllifolia* L.

Subgenus 1. **EREMOGONE** Fenzl in Endl. Gen. (1840) 967 et in Ldb. Fl. Ross. I (1842) 360. — Genus *Eremogone* Fenzl, Verbr. Alsin. (1833) 13. — Calyx finally indurated at base, obscurely 3-nerved; ovary many-ovuled; capsule many-seeded.

Series 1. **Glomeriflorae** Fenzl in Ldb. Fl. Ross. I (1842) 360. — flowers in a compact capitate inflorescence.

1. *A. dianthoides* Sm. Icon. ined. (1789) 16, tab. 16; Ldb. Fl. Ross. I, 360; Boiss. Fl. Or. I, 601; Grossg., Fl. Kavk. 3941. — Ic.: Sm., l. c., tab. 16.

521 Perennial; stems erect, 20–55 cm long, glabrous; leaves of sterile shoots linear-subulate, serrulate, 10–15 cm long; median cauline leaves with dilated sheaths, 5–6 cm long, the upper broadly lanceolate at base, long-acuminate, 1.5–2 cm long; inflorescence corymbiform; flowers subsessile; bracts broad, rigid, terminating in a long point, 1–1.5 cm long and 2.5–4 mm broad; sepals oblong-lanceolate, acuminate, membranous-margined, with a purple keel, 6–10 mm long; petals oblong-linear, tapering to a claw, 14–15 mm long, rounded at apex, 2–2.5 times as long as calyx. July–August.

Stony slopes in the subalpine zone of high mountains. — Caucasus: S. Transc., Tal. **Gen. distr.:** Arm.-Kurd., Iran. Described from Armenia. Type in Paris.

Note. *A. dianthoides* Sm. is ornamental on account of the large flowers crowded in a compact head; it deserves to be introduced into cultivation.

2. *A. cephalotes* M. B. Fl. taur.-cauc. I (1808) 346; III, 309; Fenzl in Ldb. Fl. Ross. I, 361; Shmal'g., Fl. I, 154. — *Eremogone cephalotes* Fenzl, Verbr. Alsin. (1833) tab. ad. p. 44.

Perennial; stems erect, 20–50 cm long, glabrous; leaves of sterile shoots numerous, narrowly linear, 7–13 cm long and 1 mm broad, somewhat dilated and narrowly scarious-margined at base, hispid-ciliate on the margin; median cauline leaves 5–6 cm long, connate at base into a sheath 3–4 mm long; floral leaves ovate, coriaceous, broadly white-margined, 1.5–2 cm long, subulate-tipped; flowers sessile in a dense hemispheric inflorescence; bracts subulate, 6–9 mm long; sepals ovate, acuminate, 6–7 mm long, with a green keel, broadly white-margined; petals white, obovate, slightly longer than calyx; capsule about equaling calyx. June–July. (Plate XXIX, Figure 1).

Steppe slopes. — European part: Bl. **Gen. distr.:** Centr. Eur. Described from the surroundings of Tiraspol'. Type in Leningrad.

Series 2. **Rigidae** Schischk. — Flowers in a loose inflorescence; sepals 5–10 mm long, with pointed teeth.

3. *A. rigida* M. B. Fl. taur.-cauc. I (1808) 346; III, 309; Fenzl in Ldb. Fl. Ross. I, 361; Boiss. Fl. Or. I, 693; Shmal'g., Fl. I, 154. — *Eremogone rigida* Fenzl, Verbr. Alsin. (1833) tab. ad. p. 46. — *Arenaria holostea* Beauv. ex DC. Prodr. I (1824) 402.

Perennial; stems erect, glabrous, 20–40 cm long; leaves of sterile shoots setaceous, serrulate, 8–10 cm long, with dilated sheaths; median cauline leaves narrowly lanceolate toward apex, rigid, 3–4.5 cm long, surpassing internodes; flowers in cymes forming a paniculate inflorescence; middle flowers sessile, the others on glabrous pedicels 5–9 mm long; bracts scarious, subulate, 8–9 mm long; sepals ovate-lanceolate, 5–7 mm long, with a green keel; petals oblong, rounded at apex, as long as calyx. June–July.

Stony southern slopes. — European part: M. Dnp., V.-Don, Bl. **Gen. distr.:** Centr. Eur. Described from the vicinity of Pavlograd in the Ukraine. Type in Leningrad.

4. *A. holostea* M. B. Fl. taur.-cauc. I (1808) 345; Fenzl in Ldb. Fl. Ross. I, 364; Boiss. Fl. Or. I, 694; Grossg., Fl. Kavk. II, 306, ex parte. — *Eremogone holostea* Rupr. Fl. cauc. (1869) 217. — Ic.: Rupr., l. c., tab. VI, f. 3. — Russian name: peschanka lantsetolistnaya [lanceolate-leaved], peschanka zhestkolistnaya [rigid-leaved].

Perennial, densely tufted and bearing woody shoots from base; flowering stems erect, 10–25 cm long, densely leafy, glabrous; leaves of sterile shoots long, ciliate; upper cauline leaves 1.5–2 cm long, dilated at base, subulate-tipped; flowers in corymbs of 3–5; pedicels glabrous; bracts



PLATE XXIX. 1. *Arenaria cephalotes* M.B., flower.— 2. *A. holostea* M.B., flower.—
 3. *A. lychnidea* M.B., flower.— 4. *A. gypsophiloides* L., flower.— 5. *A. juncea* M.B., flower.—
 6. *A. longifolia* M.B., flower.

lanceolate; sepals 6–8 mm long, ovate-lanceolate, glabrous, with a green keel, broadly white-margined; petals oblong, 6–6.5 mm long, slightly longer than calyx, rounded at apex. May–August. (Plate XXIX, Figure 2).

Grassy and stony, often calcareous slopes. — Caucasus: Cisc., Dag. Endemic. Described from the Caucasus. Type in Leningrad.

*5. *A. szowitsii* Boiss. Fl. Or. I (1867) 695.

Perennial; stems erect, glabrous, 20–25 cm long; leaves of sterile shoots setaceous, 3–5 cm long; cauline leaves linear-subulate, acuminate, serrulate, 2–3 cm long, mostly shorter than internodes, white-margined at base; upper leaves 9–10 mm long; inflorescence 1–5-flowered; flowers 6–11 mm long, glandular-pubescent; bracts broadly lanceolate, keeled, white-margined; petals oblong-ovate, 8–9 mm long, slightly longer than calyx. June.

Not found in the USSR but possibly occurring in S. Transc. **Gen. distr.:** Iran. Described from N. Iran. Type in Geneva; cotype in Leningrad.

6. *A. macrantha* Schischk. sp. nova in Addenda V, p. 674. *A. szowitsii* Grossg., Fl. Kavk. II, 397, non Boiss.

Perennial; rootstock creeping, 3–4 mm thick; stems several, very slightly ascending at base or erect, 10–30 cm long, scabrous-puberulous in lower part, glabrous above; radical leaves thinly setaceous, 3–7 cm long and 0.3–0.5 mm broad, ciliolate-margined; cauline leaves 2.5–8 cm long and 0.7–1.2 mm broad, rough-margined, usually much longer than corresponding internodes; inflorescence corymbiform, terminal; pedicels 4–20 mm long; bracts ovate-lanceolate, 6–10 mm long and ca. 3 mm broad, broadly scarious-margined, apiculate, glabrous; sepals ovate-lanceolate, 6–10 mm long and 3–4 mm broad, glabrous, becoming indurated at base, acuminate, broadly scarious-margined; petals white, obovate, rounded or very slightly notched at apex, slightly exceeding to 1.5 times as long as calyx; capsule ovoid, 6–7 mm long and 3.5 mm broad. June.

Stony slopes. — Caucasus: S. Transc. **Gen. distr.:** Arm.-Kurd. Described from the village of Takyaltu. Type in Leningrad.

Series 3. *Xerolemmae* Fenzl in Ldb. Fl. Ross. I (1842) 361. — Flowers in a loose corymbose-paniculate inflorescence; sepals 2–3.5 mm long, commonly obtuse.

7. *A. koriniana* Fisch. ex Fenzl in Ldb. Fl. Ross. I (1842) 363; Shishk. in Fl. Yugo-Vost. IV, 266. — *A. graminifolia* var. *Koriniana* Trautv. in Bull. Soc. Nat. Mosc. XXXIII, I (1866) 158; Kryl., Fl. Zap. Sib. V, 1031.

Perennial; stems becoming woody at base, prostrate, 15–40 cm long, glabrous; radical leaves setaceous, 7–9 cm long, divaricate, serrulate; lower and median cauline leaves longer than their internodes; upper leaves narrowly lanceolate, mostly shorter than the internodes, 2–3.5 cm long; inflorescence composed of loose cymes; pedicels 3 mm–1 cm long; glabrous; bracts scarious; sepals broad-ovate, green at center, ecarinate, scarious-margined, 2–4 mm long; petals 2–2.5 times as long as calyx. May–July.

Dry steppes and stony slopes. — European part: Transv., W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp. Described from the Orenburg semidesert area. Type in Leningrad.

8. *A. graminifolia* Schrad. Hort. Goett. I (1809) 5; Fenzl in Ldb. Fl. Ross. I, 363; Shmal'g., Fl. I, 154; Kryl., Fl. Zap. Sib. V, 1030; Shishkin in Fl. Yugo-Vost. IV, 265. — ? *A. saxatilis* L. Sp. pl. (1753) 423. — *A. filifolia* M. B. Fl. taur.-cauc. I (1808) 344, non Forsk. (1775). — *A. Biebersteinii* Schlecht. Mag. Ges. Naturf. Freunde Berlin VII (1816) 202. — *A. stenophylla* Ldb. Ind. Hort. Dorpat. (1823). — *A. ucranica* Sprent. ex Steud. Nomencl. ed. 2 (1840) 124, 127. — *Sabulina procera* Rchb. Fl. germ. exsc. (1832) 787. — *Eremogone graminifolia* Fenzl, Verbr. Alsin. (1833) 37. — *E. stenophylla* Fisch. et Mey. Ind. sem. Hort. Petrop. I (1835) 7. — Ic.: J. G. Gmel. Fl. Sib. IV (1769) tab. 63, f. 2; Maevsk., Fl. Sredn. Rossii (1918) 106.

526 Perennial; stems several, erect, glabrous, 20–40 cm long; radical leaves clustered, long, setaceous, serrate; cauline leaves somewhat broader, mostly equaling or shorter than internodes; flowers white, in cymes forming a paniculate inflorescence; pedicels greatly exceeding calyx, 5–17 mm long; sepals broad-ovate, 2.5–3.5 mm long, obtuse, broadly white-margined, 1-nerved, ecarinate; petals broad-obovate, twice as long as calyx; capsule broadly ovoid. May–August.

Inundated steppe meadows, stony slopes, forest margins, and pinewoods. — European part: Dv.-Pech., V.-Kama, Transv., Bl., L. Don, L. V.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Yenisei, Lena-Kol., Ang.-Say., Dau.; Centr. Asia: Balkh. **Gen. distr.:** Centr. Eur., Described from Siberia.

9. *A. polaris* Schischk. sp. nova in Addenda IV, p. 675. — *A. graminifolia* var. *ostrina* Schischk. in Kryl. Fl. sib. occ. V (1931) 1031.

Perennial, loosely tufted; rhizome creeping or ascending, 2–3 mm thick; flowering stems several, 10–15 cm long, glabrous; leaves of sterile shoots setaceous, 3–7 cm long, the margin smooth or faintly roughened; cauline leaves 1.5–2.5 cm long and 0.8–1.5 mm broad, often violet-tinged, connate at base into a sheath 3 mm long, the margin smooth or faintly roughened; inflorescence a 3–7-flowered corymbiform panicle; pedicels 4–20 mm long, glabrous; bracts lanceolate, scarious, commonly violet-tinged; sepals broad-ovate, ca. 3 mm long, broadly scarious-margined, violet-tinged on the back; petals white, twice as long as calyx. July–August.

Riverside sands in the Arctic region. — Arctic: Arc. Sib. (Taimyr, Yamal, Ob Gulf and Taz Bay). Endemic. Described from the Dudyty River. Type in Leningrad.

10. *A. graminea* C. A. M. Verzeichn. Pfl. cauc. (1831) 220; Boiss. Fl. Or. I, 692; Grossg., Fl. Kavk. II, 397. — *A. graminea* α *grandiflora* Fenzl in Ldb. Fl. Ross. I (1842) 361. — *Eremogone graminea* C. A. M. Ind. I Sem. Hort. Petrop. (1835) 7.

Perennial; stems few, 30–60 cm long, glabrous, the median internodes sometimes viscid; leaves of sterile shoots clustered, rigid, somewhat recurved, linear-setaceous, 9–20 cm long; cauline leaves 12–18 cm long, linear, serrulate, exceeding internodes; upper leaves somewhat shorter than their internodes, 2–4 cm long, linear, acuminate; bracts lanceolate, 5–6 mm long, attenuate toward apex, broadly scarious-margined; inflorescence an oblong corymbiform panicle; pedicels 4–8 mm long; sepals oblong-ovate, 3.5–5 mm long; petals spatulate, 6–9 mm long, 1.5 times as long as calyx. May–June.

27 Dry stony slopes. — Caucasus: E. and S. Transc., Tal. Gen. distr.: Arm.-Kurd. Described from the mountains of Talysh near Zuvant. Type in Leningrad.

11. *A. steveniana* Boiss. Fl. Or. I (1867) 602; Grossg., Fl. Kavk. II, 396. — *A. graminea* β *parviflora* Fenzl in Ldb. Fl. Ross I (1842) 362. — *A. graminifolia* Trautv. in A. H. P. II; 513; IV, 357, non Schrad. — *A. oosepala* Bordz. in Izv. Kievsk Bot. Sada XII (1931) 110.

Perennial, very slightly woody at base; stem 15–30 cm long, branched only in inflorescence, minutely puberulous in lower part, glandular in the inflorescence; leaves of sterile shoots setaceous, 6–8.5 cm long; cauline leaves linear, 4–4.5 cm long, 0.5–2 mm broad, serrulate, equaling or slightly surpassing internodes, attenuate toward apex, connate at base into a sheath to 1 mm long; upper leaves 1–2 cm long, usually shorter than internodes; flowers in a corymbiform inflorescence; pedicels 4–7 mm long, pubescent; bracts lanceolate, scarious, attenuate toward apex, 3–6 mm long; sepals broadly oblong, 2 mm long, obtuse, keeled on the back, broadly white-margined; petals oblong-obovate, 5 mm long, 1.5–2 times as long as calyx; glands 10, at the base of stamens. June–July.

Dry mountain meadows. — Caucasus: E. and S. Transc. Gen. distr.: Arm.-Kurd. Described from the vicinity of Erevan. Type in Geneva.

12. *A. asiatica* Schischk. in Animadvers. systemat. ex herb. Univ. Tomsk. no. 5–6 (1930) 3.

Perennial; stems several, erect, 30–40 cm long, glabrous; leaves of sterile shoots closely approximate, setaceous, 5–6 cm long and 0.25–0.5 mm broad; cauline leaves narrowly linear, 3–5-veined, the lower 6–9 cm long and 1–1.5 mm broad, very slightly roughened on the margin, greatly surpassing internodes; upper leaves shorter and mostly shorter than internodes; flowers in rather densely cymes forming short paniculate inflorescences 3–7 cm long; pedicels 1–7 mm long; bracts scarious except for midrib; sepals elliptic, 3–3.5 mm long, green at center, with broad scarious margins, short-acuminate; petals white, oblong, rounded at apex, narrowing below the middle, dilated at base, twice as long as calyx. July.

Borders of sand stretches. — W. Siberia: Alt. (Ust-Kamenogorsk area). Endemic. Described from the Ust-Kamenogorsk area between Ak-dzhailyau and the village of Terekty. Type in Leningrad.

13. *A. longifolia* M. B. Fl. taur.-cauc. I (1808) 345; Ldb. Fl. Ross. I, 362; Shmal'g., Fl. I, 154; Kryl., Fl. Zap. Sib. V, 1029; Shishk. in Fl. Yugo-Vost. II, 266. — *A. otitoides* Adams ex Ser. in DC. Prodr. I (1824) 102. — Ic.: Ldb. Ic. Pl. Fl. Ross. V, tab. 403.

28 Perennial; stems erect, smooth, 20–40 cm long; radical leaves clustered, setaceous, 15–20 cm long, serrulate, stiffly scabrous, the cauline narrowly lanceolate, 5–12 cm long, 1–2 mm broad, surpassing internodes; flowers very small, in cymes forming a paniculate inflorescence; pedicels glabrous; bracts scarious; sepals elliptic, obtuse, glabrous, prominently keeled; petals ovate, twice as long as calyx; capsule ovoid-oblong, 3–4 mm long. June–July. (Plate XXIX, Figure 6.)

Meadow steppes, sometimes solonchik meadows, and occasionally pinewoods. — European part: U. V., V.-Kama, V.-Don, Bl., L. Don, L. V.; Caucasus: Cisc.; W. Siberia: Irt.; Alt.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb. Gen. distr.: Mong. Described from the Volga between Saratov and Krasnoarmeisk (formerly Sarepta). Type in Leningrad.

Series 4. *Chromolemmae* Fenzl in Ldb. Fl. Ross. I (1842) 365, ex parte. — Sepals abruptly tapering to a short point; plants 20–60 cm high.

14. *A. gypsophiloides* L. Mant. I (1767) 71; Fenzl in Ldb. Fl. Ross. I, 365; Boiss. Fl. Or. I, 694; Grossg., Fl. Kavk. II, 398. — *Eremogone gypsophiloides* Fenzl, Verbr. Alsin. (1833) tab. ad. p. 57. — *Arenaria cucubaloides* C. A. M. Verzeichn. Pfl. cauc., 220, non Sm.

Perennial; stems several, erect, glabrous, 20–40 cm long; leaves of sterile shoots in clusters, setaceous, 8–12 cm long; cauline leaves narrowly linear, 4–8 cm long and 0.5–1.5 mm broad, connate at base into a sheath 1 mm long, with ciliate margin, surpassing internodes; upper leaves much shorter than internodes, 1–3 cm long; inflorescence a corymbiform panicle; flowers numerous; pedicels 7–15 mm long, glandular-pubescent (var. *viscosa* Fenzl) or glabrous (var. *glabra* Fenzl); bracts lanceolate, scarious, acuminate, 6–9 mm long; sepals 4–5 mm long, rarely 3.3–5 mm long (var. *parviflora* Boiss.), ovate-oblong, glandular-pubescent or glabrous, ecarinate, white-margined in upper part, purple at the middle; petals 8–9 mm long, 2–2.5 times as long as calyx, obovate to oblong, narrowing toward base. July–August. (Plate XXIX, Figure 4).

Dry meadows in the subalpine zone. — Caucasus: S. Transc., Tal. Gen. distr.: Arm.-Kurd., Iran. Described from the Orient. Type in London.

15. *A. cucubaloides* Smith, Ic. ined. I (1789) tab. 17; Fenzl in Ldb. Fl. Ross. I, 365; Boiss. Fl. Or. I, 695; Grossg., Fl. Kavk. II, 396. — *Eremogone cucubaloides* Fenzl, Verbr. Alsin. (1833) tab. ad p. 37. — *Arenaria lychnidea* DC. Prodr. I, 402, non M. B.

529 Perennial; stems several, erect, 25–45 cm long, glabrous; leaves of sterile shoots linear-setaceous, roughened on the margin, 12–15 cm long; cauline leaves narrowly lanceolate, tapering toward apex, 6–10 cm long, serrulate, with sheaths 5–12 mm long; upper cauline leaves 1.5–2 cm long; inflorescence loosely corymbose; pedicels 1–2.5 cm long, glandular or glabrous (var. *glabra* Fenzl); bracts 5–10 mm long, scarious; sepals oblong, glandular, 4–7 mm long, keeled, white-margined; petals 10–17 mm long, 3–4 times as long as calyx, obovate to oblong, narrowing toward base. April–July.

Dry meadows and gravelly mountain slopes in the subalpine zone. — Caucasus: S. Transc., Tal. Gen. distr.: Arm.-Kurd. Described from Armenia. Type in London.

16. *A. juncea* M. B. Fl. taur.-cauc. III (1819) 309; Fenzl in Ldb. Fl. Ross. I, 366; Turcz. Fl. baic.-dahur. I, 323; Maxim. Prim. Fl. Amur., 54 Kom., Fl. Manchzh. II, 166. — *A. dahurica* Fisch. ex DC. Prodr. I (1842) 402. — *Eremogone juncea* Fenzl, Verbreit. Alsin. (1833) tab. ad p. 37.

Perennial, with a stout taproot and numerous remnants of dead leaves; stems numerous, erect, 20–60 cm long, glabrous from base, pubescent in

upper part; basal leaves clustered, long, narrow, stiff, glabrous, serrulate, about equaling the stems, the median shorter, 6–10 cm long, connate at base into a sheath 4–6 mm long, the upper 1.5–3 cm long; flowers numerous, in a corymbiform inflorescence composed of 1- or 2-flowered cymes; pedicels long, glandular-pubescent or (in var. *glabra* Rgl.) pedicels and sepals glabrous; sepals ovate, acuminate, membranous-margined, glandular-pubescent, green at center, 5–5.5 mm long; petals obovate or broad-oval, 2–2.5 times as long as calyx, rounded at apex, 6–8 mm long. July–August. (Plate XXIX, Figure 5).

River valleys and exposed mountain slopes. — E. Siberia: Dau., Far East: Ze.-Bu., Uss. Gen. distr.: Jap. Ch., Mong. Described from E. Siberia. Type in Leningrad.

Series 5. *Sclerophyllae* Boiss. Fl. Or. I (1867) 690. — Plants 5–20 cm high; leaves setaceous, commonly short, and sometimes spinescent.

17. *A. formosa* Fisch. ex DC. Prodr. I (1824) 402; Fenzl in Ldb. Fl. Ross. I, 366; Kryl., Fl. Zap. Sib. V, 1032; Turcz. Fl. baic.-dahur. I, 224. — *A. capillaris* α . *formosa* et δ *nardifolia* Rgl. in Bull. Soc. Nat. Mosc. XXXV I (1862) 252, 253. — *A. nardifolia* Ldb. Ic. Pl. Fl. Ross. I (1829); Bge. in Ldb. Fl. Alt. II, 166. — Ic.: Maxim. Fl. Tangut. (1889) tab. 15; Ldb. Ic. pl. Fl. Ross. I, tab. 6.

530

Perennial, densely tufted, 5–15 cm long, with numerous woody shoots and tufts of marcescent leaves at base; stems numerous, prostrate or ascending, glandular-pubescent in upper part (var. *glandulosa* Fenzl) or glabrous (var. *glabra* Fenzl); all leaves narrowly linear, with revolute margins, serrulate, the radical 5–7 cm long and 0.5–1.5 mm broad, the cauline leaves subulate-acuminate, 1–2.5 cm long, about equaling or slightly surpassing internodes; flowers in cymes of 2 or 3, rarely more; pedicels glabrous or glandular-pubescent (var. *glandulosa* Fenzl), 5–15 mm long; bracts lanceolate, scarious, acuminate; sepals ovate, 5–6 mm long and 2–3 mm broad, twice as long as calyx; capsule ovoid, 1.5 times as long as calyx. June–July.

Rocks, rock streams, and moraines in the alpine zone; also gravelly lichen-tundra. — Arctic: Arc. Sib.; W. Siberia: Alt; E. Siberia: Lena-Kol. (Khatanga and the border area between Ze.-Bu. and Lena-Kol.), Ang.-Say., Dau. Gen. distr.: Mong. Described from Dauria. Type in Geneva.

18. *A. lychnidea* M. B. Fl. taur.-cauc. I (1808) 347; Fenzl in Ldb. Fl. Ross. I, 366; Boiss. Fl. Or. I, 696. — *Arenaria setacea* Fisch. ex Ser. in DC. Prodr. I (1824) 402, non Thuill. — *Eromogene lychnidea* Rupr. Fl. Cauc. (1869) 219.

Perennial; stems numerous, erect, slender, 10–20 cm long, glabrous in lower part, glandular-pubescent above, densely tufted; leaves of sterile shoots setaceous, 2–2.5 cm long, ciliolate; inflorescence corymbiform, 3–7-flowered; pedicels glandular or glabrous (var. *glabra* Albov), 4–7 mm long; bracts scarious, lanceolate; sepals ovate-oblong, 4–5 mm long, alternately obtuse or acute; petals cuneate-oblong, 7–10 mm long, twice as long as calyx. May–July. (Plate XXIX, Figure 3).

Gravelly and rocky slopes in the high-mountain zone. — Caucasus: Cisc. (Gr. Cauc.), W. Transc., Dag. Endemic. Described from the Caucasus. Type in Leningrad.

19. *A. capillaris* Poir. Encycl. Meth. VI (1804) 380; Fenzl in Ldb. Fl. Ross. I, 367; Kom., Fl. Kamch. II, 96. — *A. sibirica* Pers. Synops. I (1805) 504. — *A. Laxmanni* Fisch. ex Ser. in DC. Prodr. I (1824) 402. — *A. subulata* Ser. in DC. Prodr. I (1824) 403. — *A. capillaris* α *typica*, β *airifolia*, ϵ *kamtschatica* Rgl. in Bull. Soc. Nat. Mosc. XXXV, I (1862) 253. — *A. lychnidea* Turz. Fl. baic.-dahur. I (1842) 224, non M. B. — Ic.: Rgl. in Bull. Soc. Natur. Moscou XXXV, 1 (1862) tab. 1, f. 18–20; Rgl. et Herder, Reisen Süd. Ost. Sibir. II, tab. 8.

Perennial, densely tufted, with numerous woody shoots and marcescent leaves at base; stems numerous, erect, 5–15 cm long, glandular-pubescent (var. *glandulifera* (Ser.) Schischk.); leaves setaceous, bright green, with revolute margins, crenate, the radical 3–6 cm long, the cauline 2–3.5 cm long, subulate-acuminate; flowers in cymes of 2 or 3; pedicels glandular-pubescent or glabrous (var. *glabrata* (Ser.) Schischk.), 1–2 cm long; bracts narrowly lanceolate, scarious-margined, acuminate; sepals ovate-lanceolate, ecarinate, often dark violet at center, mucronate, glabrous, 5–6 mm long and 1.5–2 mm broad; petals oval, rounded at apex, 8–10 mm long, 1.5–2 times as long as calyx. July–August. (Plate XXX, Figure 5).

Rocks and dry stony tundras of the alpine zone, and in the Arctic region. — Arctic: Chuk., An.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Sakh., Okh., Kamch., Ze.-Bu. Gen. distr.: N. Mong. Described from Siberia. Type in Geneva.

20. *A. mongolica* Schischk. in Acta Inst. Bot. Acad. Sc. URSS. Ser. 1, III (1936).

Perennial, forming subpulvinate mats ca. 5 cm in diameter; taproot rather stout, multicipital, giving rise to numerous abbreviated shoots densely covered with scales, these coriaceous, ovate, acuminate, whitish, 4–5 mm long and ca. 2 mm broad, with a prominent midrib; flowering branches 1.5–3 cm long, ascending at base, glabrous, bearing 1 or 2 pairs of leaves; leaves filiform-subulate, 5–12 mm long and 0.3–0.5 mm broad, short-mucronate, glabrous, 1-veined, the cauline 1 or 2 pairs, resembling the radical but smaller; flowers solitary at the end of stem; sepals ovate, ca. 4 mm long, acute, green on the back, with broad scarious faintly colored margin; petals white, 1.5 times as long as calyx. August.

Gravelly slopes in the high-mountain zone. — W. Siberia: Alt. Endemic. Described from the Sailyugem Range (Aksai). Type in Leningrad.

21. *A. meyeri* Fenzl in Ldb. Fl. Ross. I (1842) 368; Kryl., Fl. Zap. Sib. V, 1093. — *A. capillaris* var. *meyeri* Maxim. Enum. Pl. Mong. (1889) 98; Williams in Journ. Linn. Soc. XXXIII (1897–1898) 415.

Perennial, with a stout taproot, pulvinate, with numerous woody shoots; stems numerous, spreading, 6–14 cm long, glandular-pubescent in upper part; radical leaves 1–3 cm long, the cauline subulate, acuminate, 5–11 mm long, much shorter than internodes; flowers in groups of 5–7; pedicels glandular-pubescent, 5–10 mm long, forming a corymbose-paniculate terminal inflorescence; bracts lanceolate, scarious, 3–4 mm long; sepals 4–6 mm long, ovate-lanceolate, acuminate, green at center, with white scarious margins, slightly glandular-pubescent; petals ovate, irregular at apex, notched, 1.5 times as long as calyx. June–July.



PLATE XXX. 1. *Arenaria potaninii* Schischk., flower. — 2. *A. serpyllifolia* L., flower. — 3. *A. rotundifolia* M.B., flower. — 4. *A. pseudofrigida* (Ostenf. et Dahl) Juz., flower. — 5. *A. capillaris* Poir., flower. — 6. *A. griffithii* Boiss., flower. 7. *A. insignis* Litw., flower.

Low rounded hills and gravelly slopes. — W. Siberia: Irt., Alt.; Centr. Asia: Dzu.-Tarb., T. Sh. Gen. distr.: Mong. Described from Mt. Kent. Type in Leningrad.

22. *A. tschuktschorum* Rgl. in Bull. Soc. Nat. Mosc. XXXV, 1 (1862) 254. — Ic.: Rgl. l. c., tab. II, f. 1–4.

A bluish-green densely tufted undershrub, with numerous shoots from base; stems numerous, ascending, 15–20 cm long, glabrous; all leaves rigid, spreading, subulate, channeled, with revolute margins, serrulate, tapering to a spiny point; radical leaves 1–1.5 cm long; radical 5–9 mm long; flowers in cymes of 2–5; pedicels glabrous, 8–12 mm long; bracts lanceolate; sepals ovate, 3.5–4 mm long and 1.5–2 mm broad; petals ovate, 5.5–7 mm long, twice as long as calyx. July.

Rock streams and outcrops. — Arctic: Chuk. Endemic. Described from the Chukchi Peninsula (banks of the Filippovka and Kolyma rivers). Type in Leningrad.

23. *A. ferganica* Schischk. in Trav. Mus. Bot. Acad. Sc. URSS. XXIV (1932). 31. — Ic.: Schischk. l. c., 32.

Perennial, with a multicapital taproot, forming pulvinate mats with numerous remnants of marcescent leaves, sparsely pubescent in upper part; stems 6–9 cm long, glandular-pubescent; radical leaves rigid, linear-lanceolate, subulate-acuminate, 5–6 mm long, smooth, the margin ciliolate; flowers in groups of 1–3; pedicels glandular-pubescent; bracts lanceolate, acuminate, 3.5–5 mm long, scarious-margined; sepals ovate-lanceolate, green at center, white-margined, 4–6 mm long, glandular-pubescent; petals ovate-lanceolate, 1.5 times as long as calyx. August.

Rocks and rock streams in the mountain zone. — Centr. Asia: Pam.-Al. Endemic. Described from the Alai Range (Isfairam River basin, Austem River). Type in Leningrad.

535 24. *A. insignis* Litw. Trav. Mus. Bot. Acad. Sc. Petersb. III (1907) 106. — Exs.: H. F. A. M. no. 463.

Perennial, forming dense spiny pulvinate mats, stems 15–25 cm long, smooth, somewhat spreading; sterile branches densely leafy; radical leaves rigid, linear, subtrigonous, spinescent, 5–7 mm long, 1 mm broad; cauline very small, 3–5 mm long, connate at base into a sheath; bracts leaflike, 3–3.5 mm long; cymes 1–3-flowered; pedicels commonly erect, 1–2.5 cm long, glabrous; sepals glabrous, lanceolate, 3.5–4 mm long, obscurely nerved, the keel produced into a point, the margin membranous; petals white, ovate-oblong, obtuse, 1.5 times as long as calyx. June. (Plate XXX, Figure 7).

Rocks and stony mountain slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from the Bazikayanov Range in Turkmenia on the Iranian border and from the vicinity of Ashkhabad. Type in Leningrad.

*25. *A. ledebouriana* Fenzl in Russeng. Reis. II (1841) 93; Boiss. Fl. Or. I, 696; Grossg., Fl. Kavk. II, 397. — Ic.: Boiss. in Ann. Sc. Nat. (1854) 247.

Perennial, densely tufted; stems 10–20 cm long; leaves of sterile shoots crowded, setaceous, rigid, 8–12 mm long, serrulate; cauline leaves 5–9 mm long, awn-pointed; inflorescence corymbiform, many-flowered; sepals oblong, acute, 2.5–3 mm long, narrowly scarious-margined; petals 5–6 mm long, oval, twice as long as calyx. July.

Mountains. — **Gen. distr.:** Bal.-As. Min., Arm.-Kurd. Described from Trebizond in Anatolia.

Note. Apparently not occurring in the USSR. Reported by Boissier and by Grossheim for Armenia from Nordman's collections, but the plants concerned were collected outside USSR territory.

26. *A. paulsenii* H. Winkler in Kjob. Vidensk. (1903) 107. — *A. Litwinowii* Schischk. in Trav. Mus. Bot. l'Acad. Sc. URSS XXIV (1932) 33. — Ic.: H. Winkl., l. c.; Schischk., l. c., fig. 3.

Perennial, woody at base, loosely tufted; flowering stems erect, 10–25 cm long, slender, glabrous; radical leaves setaceous, thin, subulate-acuminate, 10–17 mm long, smooth; flowers in groups of 2 or 3 forming a corymbiform inflorescence; pedicels 13–20 mm long; bracts lanceolate, 1.5 mm long, green at center, white-margined; sepals ovate-lanceolate, acuminate, 4 mm long and 2 mm broad, green at center, with a white scarious margin; petals oblong, 1.5–2 times as long as calyx. July.

536 Southern slopes in the high-mountain zone. — Centr. Asia: SW part of T. Sh., Pam.-Al. Endemic. Described from the Alai Range (Sofi-Kurgan), at altitudes of about 2,400 m. Cotype in Leningrad.

27. *A. griffithii* Boiss. Diagn. Ser. II, I (1854) 89; Fl. Or. I, 697; B. Fedtsch. in A. H. P. XXIII, 474 and 247. — *A. glaucescens* H. Winkl. in Kjob. Vidensk. (1903) 107. — Exs.: H. F. A. M. no. 121.

Perennial, with a stout taproot, loosely tufted, suffrutescent at base with numerous woody shoots; flowering stems spreading, prostrate, 10–20 cm long, glabrous in lower part, pubescent above; leaves of sterile shoots setaceous-subulate, spreading, clasping at base, 7–9 mm long; median cauline leaves 8–12 mm long, subulate-linear, elongate-acuminate, the upper 3–4 mm long, shorter than internodes; flowers in cymes of 5–7 forming a corymbiform inflorescence; pedicels glandular-pubescent, 8–14 mm long; bracts 2–3.5 mm long, lanceolate, green at center, the margins white-membranous; sepals 3–5 mm long, ovate, acuminate, green at center, glandular-pubescent, the margin ciliolate; petals obovate, white or pinkish, wavy-margined, 1.5–2 times as long as calyx. June–July. (Plate XXX, Figure 6).

Stony slopes and open juniper woods in the mountain zone. — Centr. Asia: Pam. Al. **Gen. distr.:** Afghanistan. Described from Afghanistan (Mt. Kuh-i-bab, at an altitude of about 1,800 m). Type in Geneva.

Subgenus 2. **MONOGONE** (Maxim.) Schischk. — Section *Monogone* Maxim. in Bull. Acad. Pétersb. XXVI (1880) 436. — Stamens 5, opposite petals, alternating with 5 staminodes; ovary containing 2 ovules; capsule 1-seeded.

28. *A. potaninii* Schischk. nom. nov. — *A. pentandra* Maxim. in Bull. Acad. Pétersb. XXXVI (1880) 430 et in Mélange Biolog. X, 580, non aliorum; Kryl., Fl. Zap. Sib. V, 1934. — Ic.: Maxim. Enum. Pl. mongol. (1889) tab. 6.

Undershrub with a stout taproot, woody from base, with much branched caulescent shoots, 20–30 cm high; radical leaves in numerous basal clusters, 2.5–4 cm long, thick, subulate, acuminate, with revolute margins; cauline leaves 10–12 mm long, two-thirds as long as to equaling internodes;

flowers in loose cymes; pedicels glabrous, 1–2 cm long; bracts lanceolate, scarious, with a green keel, 2.5–3 mm long; sepals lanceolate, 4–4.5 mm long, broadly scarious-margined; petals obovate, rounded at apex, slightly longer than calyx; stamens 5, alternating with 5 staminodes; capsule 1-seeded. June–July. (Plate XXX, Figure 1).

Rocks. — W. Siberia: Alt. (village of Malokrasnoyarskoe on the Irtysh River); Centr. Asia: Dzu.-Tarb. (Mt. Kichkine-tau near Zaisan). Endemic. Described from Mt. Kichkine-tau. Type in Leningrad.

Subgenus 3. **EUTHALIA** Fenzl in Endl. Gen. (1840) 967 et in Ldb. Fl. Ross. I (1842) 368. — Sepals not becoming indurated at base, 1–3-nerved; leaves lanceolate, ovate, or suborbicular.

Series 1. **Humifusae** Schischk. — Perennials; sepals 1-nerved; petals 1.25 or 1.5–2 times as long as calyx. Arctic plants.

29. *A. humifusa* (Swartz) Whlb. Fl. lapp. (1812) 129; Nordhagen in Bergens Museums Arb. I (1935) 24. — *Stellaria humifusa* Swartz ex Whlb., l. c. — *Arenaria ciliata* var. *humifusa* Hartm. Scand. Fl. ed. 4 (1843). — *A. norvegica* var. *humifusa* E. Fries, Summa Veg. Scand. (1846) 158. — *A. cylindrocarpa* Fernald in Rhodora (1914) 43. — Ic.: Lindm. Svensk. Fanerogamfl. (1918) 244.

Perennial, densely or loosely matted; underground stems creeping, slender, brittle; flowering branches ascending, 0.5–15 cm long, pubescent or glabrous, 1–4-flowered; leaves imbricate or more or less divergent, lanceolate or oblanceolate or oblong, 2–10 mm long and 0.5–2 mm broad, fleshy, subacute, glabrous, obscurely 1-veined; sepals oblong, obtuse to acutish, obscurely 1-nerved, without a scarious margin, in fruit closely appressed to capsule; petals narrowly oblong, as long as calyx; anthers carneous; capsule cylindric, slightly exceeding calyx; seeds 0.6–0.7 mm long, dark brown, shining, obscurely rugose. July.

European part: Kar.-Lap. (Fasker-Khal'ven). Gen. distr.: Scand., W. Greenland, N. Am., Labrador, British Columbia. Described from Lille-Tokin. Type in Stockholm.

30. *A. pseudofrigida* (Ostenf. et Dahl) Juz. in Herb. Inst. Bot. Ac. Sc. URSS. — *A. ciliata* subsp. *pseudofrigida* Ostenf. et Dahl in Nyt. Magaz. LV (1917) 217. — *A. ciliata* var. *frigida* Kjellm. et Lundstr. Fanerogam. fr. Nov. Seml. Vega Exp. Vet. Jaklt. I (1882) 311. — *A. ciliata* Fenzl in Ldb. Fl. Ross. I, 370, non L.

Perennial, densely matted; stems prostrate, profusely branched, pubescent, 4–7 cm long; leaves oblong-obovate to obovate, obtuse, 4–5 mm long, the margin ciliolate at base; pedicels pubescent, 2–3 times as long as calyx; sepals ovate or ovate-lanceolate, 3.5–4 mm long, obscurely nerved, sparsely pubescent at base; petals oblong or oval, obtuse, one-third longer than calyx; capsule equaling or sometimes slightly exceeding calyx. July–September. (Plate XXX, Figure 4).

538 Stony tundra. — Arctic: Nov. Z., Vaigach Island; European part: Kar.-Lap. Gen. distr.: Arc. Norway, Spitsbergen, E. Greenland. Described from Arctic Norway. Type in Oslo.

31. *A. redowskii* Cham. et Schlecht. in *Linnaea* I (1826) 58; Ldb. *Fl. Ross.* I, 370. — Ic.: Rgl. et Herd., *Reisen südost. Sibir.* (1862) tab. 9.

Perennial with slender roots, forming a small tuft; stems slender, delicate, pubescent from base to summit, 6–10 cm long; all leaves sessile, oval, 3–5.5 mm long, subulate-apiculate, pubescent, ciliate at base; flowers solitary or paired; pedicels pubescent, 2–2.5 cm long; sepals oval-lanceolate, acuminate, broadly scarious-margined, 3–4 mm long; petals obovate, rounded at apex, 6 mm long, 1.5–2 times length of calyx. July.

E. Siberia: Lena-Kol., Far East: Okh., Endemic. Described from the Far East. Type in Leningrad.

Series 2. *Rotundifolia* Schischk. — Perennials; petals shorter than or as long as calyx; sepals 1-nerved. Glabrous plants.

32. *A. rotundifolia* M. B. *Fl. taur.-cauc.* I (1808) 314; Fenzl in Ldb. *Fl. Ross.* I, 369; Boiss. *Fl. Or.* I, 700; Grossg., *Fl. Kavk.* II, 395. — *Euthalia rotundifolia* Rupr. *Fl. Cauc.* (1869) 220. — *A. ovalifolia* Som. et Lev. in *A. H. P.* XIII (1893) 40; Grossg., l. c., 395. — *A. rotundifolia* var. *colchica* Alb. *Prodr. Fl. colch.* (1895) 36.

Perennial with slender fibrous roots, loosely tufted, divaricately branched from base; stems creeping, 5–20 cm long; leaves suborbicular, 5–6 mm long, 4–5 mm broad, short-petioled; flowers in cymes of 5–9; pedicels sparingly pubescent, 4–7 mm long; sepals 2.5–3 mm long, oblong-lanceolate, 1-nerved, green, with a white margin (var. *flaccida* Rupr. — pedicels longer than calyx; sepals more acute); petals 2–3 mm long, shorter than to equaling calyx. June–July. (Plate XXX, Figure 3).

Damp meadows in the subalpine and alpine zones. — Caucasus: Gr. Cauc., Dag., W., E., and S. Transc. **Gen. distr.:** As. Min. Described from the Kaimaur Mountains. Type in Leningrad.

33. *A. turkestanica* Schischk. in *Acta Inst. Bot. Acad. Sc. URSS.* Ser. 1, III (1936).

Perennial; stems 5–20 cm long, glabrous, loosely tufted, divaricately branched from base, creeping; leaves suborbicular, 5–6 mm long and 4–5 mm broad, with a very short petiole; flowers in cymes of 5–9; pedicels glabrous; sepals oblong-lanceolate, 3–4 mm long, narrowly white-margined, with a green keel. July.

Taluses and gravel screes in the alpine zone. — Centr. Asia: T. Sh., Pam.-Al., Dzu.-Tarb. Described from the Gissar Range. Type in Leningrad.

539 Note. A species closely related to *A. rotundifolia* and replacing it in Central Asia. Distinguishable by its larger calyx and always glabrous pedicels.

Series 3. *Serpyllifoliae* Schischk. — Annuals; sepals 3-nerved; petals shorter than calyx.

34. *A. serpyllifolia* L. *Sp. pl.* (1753) 423; Fenzl in Ldb. *Fl. Ross.* I, 168; Boiss. *Fl. Or.* I, 701; Shmal'g., *Fl. I.* 153; Kryl., *Fl. Zap. Sib.* V, 1034; Shishkin in *Fl. Yugo-Vost.* IV, 265. — *Euthalia serpyllifolia* Rupr. *Fl. Cauc.* (1869) 220. — *A. Wallichiana* Ser. in *DC. Prodr.* I, (1824) 411. — Ic.: Rchb. *Fl. Germ.* V, tab. 216. — Exs.: HFR no. 1560.

Annual with slender roots; stems divaricately branched, 5–25 cm long, glandular-pubescent or eglandular with short hairs (var. *scabra* Fenzl),

or leaves, pedicels, and calyx glandular-pilose (var. *viscida* DC.); leaves subsessile, ovate-acuminate, 4–7 mm long, 2–3 mm broad; flowers in cymes; pedicels 6–8 mm long; sepals ovate-lanceolate, acuminate, distinctly 3-nerved, 3–4.5 mm long, 1–1.5 mm broad, broadly white-margined; petals two-thirds as long as calyx; capsule ovoid, slightly exceeding calyx. May–September.

Exposed places, stony slopes, fields, and near dwellings. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. V.; Caucasus: Cisc., Dag., W. and E. Transc., Tal.; W. Siberia: Ob, U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kara K., Mtn. Turkm., Syr D., Pam.-Al., T. Sh. Gen. distr.: Centr. Euro., Bal.-As. Min., Jap.-Ch., N. Am. Described from Europe. Type in London.

35. *A. leptoclados* Guss. Fl. Sic. II (1844) 824; Boiss. Fl. Or. I, 701; Williams in Journ. Linn. Soc. XXXIII (1898) 367; Aschers. et Graebn. Syn. V, I (1919) 495; Grossg., Fl. Kavk. II, 395; Shishkin in Fl. Yugo-Vost. IV, 260. — *A. serpyllifolia* var. *tenuior* Koch, Syn. ed. I (1837) 422. — Ic.: Sowerby et Sm. Engl. Bot. Suppl. V (1863) t. 2972. — Exs.: Fl. Ital. exsic. no. 254.

Biennial; stem slender, pubescent, 5–15 cm long; leaves ovate, acuminate, subsessile, 3–5 mm long; flowers in cymes of 5–9; pedicels 4–7 mm long, sepals pubescent, ovate-acuminate, 3 mm long; petals one-third as long as calyx; capsule very slightly enlarged at base, subcylindric, equaling calyx. July.

Dry sandy places. — Caucasus: W. Transc., Tal. Gen. distr.: Centr. Eur., Med., Bal.-As. Min., Ch., Afr. Described from Sicily. Type in Naples.

Note. Very closely related to *A. serpyllifolia*, with a more southerly distribution area. The two species are linked by various transitional forms. *A. leptoclados* is characterized by shorter petals and capsule as long as calyx.

540

Genus 473. **MOEHRINGIA*** L.

L. Syst. ed. 2 (1740) 22; Gen. pl. ed. 5 (1754) 170.

Sepals 5; petals 5, entire, white; stamens 10; styles 3; ovary unilocular, containing numerous ovules; capsule dehiscent by 6 recurved valves; seeds smooth, shining, with a pectinate appendage at the hilum, this sometimes extending over one-third of the seed circumference. Perennial herbs with a weak stem and elliptic or ovate leaves.

1. Petals much shorter than calyx; lower leaves with petioles about as long as blade; scarious bracts wanting 1. *M. trinervia* (L.) Clairv.
- + Petals 2–3 times as long as calyx; all leaves sessile or the lower with a very short petiole 2.
2. Sepals acute or acuminate; leaves lanceolate to linear-lanceolate; peduncles 1-flowered, ebracteate 4. *M. umbrosa* (Bge.) Fenzl.

* Named for the scientist Paul Heinrich Gerhard Moehring of Oldenburg, a contemporary of Linnaeus (1710–1793).

- + Sepals obtuse; leaves elliptic or oblong; peduncles often 2-flowered; pedicels with 2 small bracteoles 3.
- 3. Stems 5–20 cm long; leaves of sterile shoots equaling those of flowering stems; bracts scarious 2. *M. lateriflora* (L.) Fenzl.
- + Stems 40–60 cm long; leaves of sterile shoots 2–4 times as long as those of flowering stems; bracts scarious only on the margin 3. *M. elongata* Schischk.

1. *M. trinervia* (L.) Clairv. Man. Herb. (1811) 150; Fenzl in Ldb. Fl. Ross. I, 371; Shmal'g., Fl. I, 155; Kryl., Fl. Zap. Sib. V, 1036. — *Arenaria trinervia* L., Sp. pl. (1753) 423. — *Alsine trinervia* Crantz, Inst. II (1766) 406. — Ic.: Fl. Yugo-Vost. IV, fig. 307, p. 267.

Annual or biennial; stems prostrate, ascending, or erect, 10–30 cm long, forming a very loose tuft, branched from base, puberulent; leaves ovate to ovate-oblong, acute, 3- or more rarely 5-veined, the lower with petioles about as long as blade, the upper subsessile, ciliate at base, on both surfaces glabrous or puberulent, 5–15 (25) mm long, and 3–10 (15) mm broad; flowers solitary, axillary or sometimes also terminal; pedicels slender, 5–25 mm long; sepals lanceolate, 3–4 (4.5) mm long and 1–2 mm broad, acuminate, with a prominent pubescent midrib, the scarious margin ciliate; petals oblong-obovate, two-thirds as long as calyx; capsule globular-ovoid, shorter than calyx, with recurved teeth. May–July. (Plate XXXI, Figure 4).

Shady and open woods, groves, scrub, banks of rivulets, and rarely old fields. — European part: almost throughout; Caucasus: Cisc., Dag., W. and E. Transc.; W. Siberia: Ob, U. Tob., Alt; E. Siberia: Ang.-Say. (Minusinsk District); Centr. Asia: Ar.-Casp., Dzu.-Tarb., T. Sh. Gen. distr.: Scand., Centr. and Atl. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran., Dzu.-Kash. Described from Europe. Type in London.

2. *M. latiflora* (L.) Fenzl, Verbr. Als. tab. ad. p. 18 (1833) 38; Fenzl in Ldb. Fl. Ross. I, 371; Turcz. Fl. baic.-dahur. I, 225; Shmal'g., Fl. I, 155; Kryl., Fl. Zap. Sib. V, 1036. — *M. lateriflora* α *typica* β *intermedia*, γ *glabrescens*, δ *angustifolia*, ϵ *gracilis* Rgl. in Bull. Soc. Nat. Mosc. XXXV, 1 (1862) 258–260. — *M. lateriflora* subsp. *genuina* et subsp. *glabrescens* Bulavk. in Bull. Jard. bot. princ. URSS, XXV (1926) 26. — *Arenaria lateriflora* L. Sp. pl. (1753) 423; Harold St. John in Rhodora XIX (1917) 259.

Perennial; rootstock slender, more or less horizontal, branched; stems several, erect, simple or branched, 5–20 cm long, hispid; leaves elliptic or lanceolate, 1–2 cm long and 3–10 mm broad, obtuse to subacute, puberulent, with ciliate margin, 1–3-veined, narrowing toward base, sessile; flowers in axillary 1–2 (5)-flowered inflorescences or terminal; pedicels long, bearing 2 bracteoles about the middle; sepals ovate, obtuse, 2–3 mm long, glabrous, with a white scarious margin; petals oblong-obovate, 2–3 times as long as calyx; stamens pubescent at base; capsule ovoid, about twice as long as calyx. May–June. (Plate XXXI, Figure 3).

Sparse coniferous and mixed forests, pinewoods, scrub, banks of small rivers, and meadows. — Arctic: An.; European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. Dnp., M. Dnp., U. V., V. -Don, V. -Kama, L. Don (NW), Transv.; W. Siberia: all regions; E. Siberia: all regions; Far East: all regions;

Cent. Asia: Dzu.-Tarb. **Gen. distr.**: Scand., Jap.-Ch., N. Mong., Ber., N. Am.
Described from Siberia. Type in London.

3. *M. elongata* Schischk. sp. nova in Addenda V p. 675.

542 Perennial; rootstock slender, branched, giving rise to flowering and sterile shoots; flowering stems 10–15 cm long, minutely hispidulous, rather densely leafy; leaves ovate or elliptic, 2–2.5 cm long and 0.8–1.2 cm broad, obtuse to subacute, puberulent, sparingly ciliate on the margin, with a prominent midrib and 5–7 obsolescent lateral veins, narrowing toward base, sessile, longer than corresponding internodes; flowering stems several, ascending 40–60 cm long, sometimes very slightly branched at summit, glabrous except for the minutely hispidulous summit, delicate, the internodes 4.5–5 cm long; leaves elliptic, 5–10 mm long and 2–4 mm broad, acute or obtuse, very much shorter than corresponding internodes; flowers in a few-flowered cyme or solitary at the end of stem; pedicels hispid, 10–22 mm long; bracts lance-linear, 1.5–2 mm long, herbaceous, narrowly scarious-margined; sepals broad-ovate, 2 mm long, glabrous, 3-nerved, with a white scarious margin; petals obovate, twice as long as calyx; capsule ovoid, 1.5 times as long as calyx. Fl. August, fr. October.

Shaded moss-covered rocks and stones. — Far East: Uss. (upper reaches of the Suputinka River and the village of Lunza). Endemic. Described from the Suputinka River. Type in Leningrad.

4. *M. umbrosa* (Bge.) Fenzl, Verbr. Als. tab. ad p. 18 (1833) 38; Fenzl in Ldb. Fl. Ross. I, 372, excl. nonnul. syn.; Kryl., Fl. Zap. Sib., V, 1037. — *Arenaria umbrosa* Bge. in Ldb. Fl. Alt. II (1830) 173. — *Moehringia lateriflora* var. *umbrosa* Rgl. in Bull. Soc. Nat. Mosc. XXXV (1862) 260. — Ic.: Ldb. Ic. pl. Fl. Ross. IV, tab. 322.

Perennial; rootstock more or less horizontal, long, branched; stems several, erect, slightly branched, 10–20 cm long, puberulent; lower leaves ovate-oblong, subobtuse; median lanceolate to lance-linear, 2–4 cm long and 3–6(10) mm broad, acute, subsessile, 3-veined, the margin and midrib hispid; flowers solitary, axillary and terminal; pedicels long, slender, scabrous, ebracteolate; sepals oblong-lanceolate, 3(–5) mm long and 1–1.5 mm broad, acute, glabrous, the margin white scarious; petals oblong-obovate, 2–2.5 times as long as calyx; stamens pubescent at base; capsule ovoid, 1.5 times as long as calyx, with recurved teeth. June–July. (Plate XXXI, Figure 2).

Rocks and stony slopes, shady mountain forests, often near the timberline. — W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb., T. Sh. Endemic. Described from Altai (Chechulikha, Aleksandrovsk, Gramatukha near Riddersk [Leninogorsk]). Type in Leningrad.

545 Genus 474. **MERCKIA** * FISCH.**

Fisch. ex Cam. et Schlecht. in Linnaea I (1826) 59.

Sepals 5, persistent; petals 5, white, about as long or slightly exceeding calyx; stamens 10; styles 3; capsule globose, inflated, with 6 deep furrows, dehiscing into 3 parts corresponding to the locules.

* Named for Karl Merck, who participated in Billings' expedition to East Siberia (1786–1793).

** Treatment by O.A. Murav'eva.

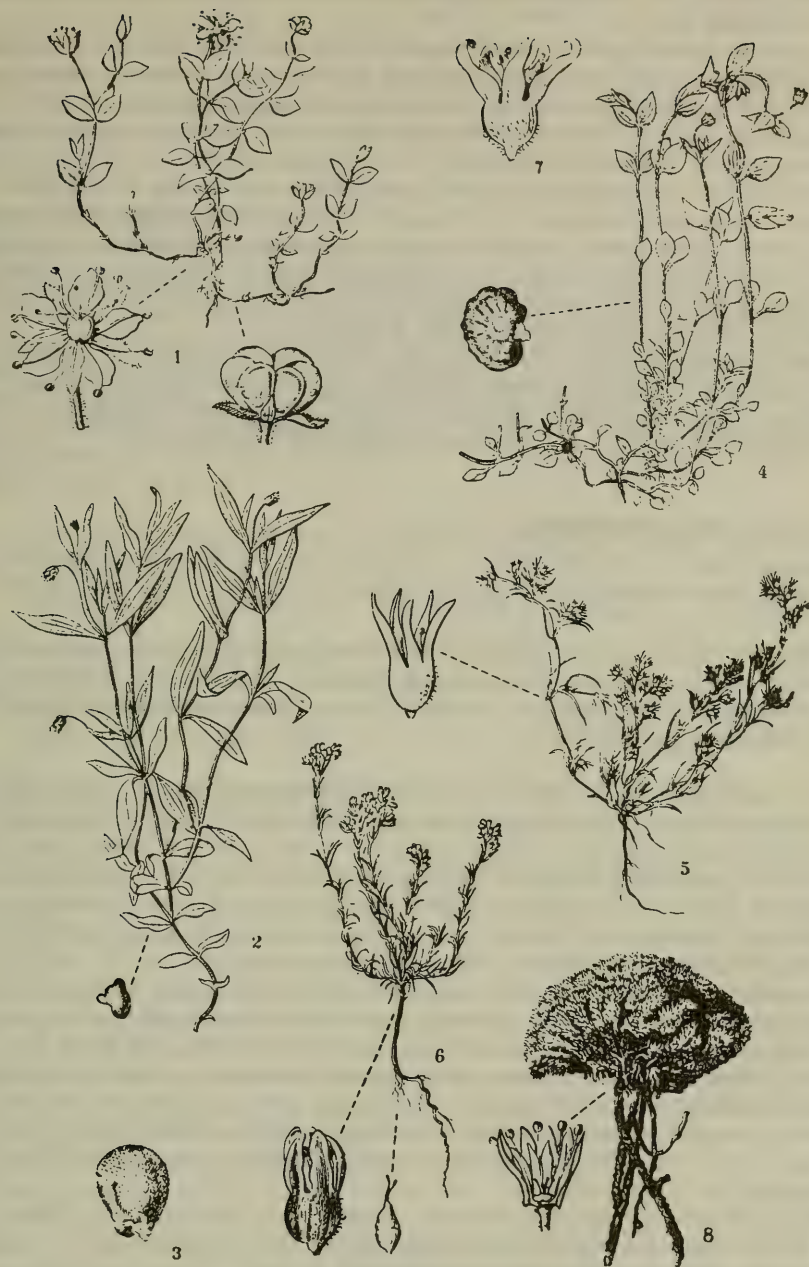


PLATE XXXI. 1. *Merckia physodes* (D.C.) Fisch., flower, capsule. — 2. *Moehringia umbrosa* (Bge.) Fenzl., seed. — 3. *M. lateriflora* (L.) Fenzl. — 4. *M. trinervia* (L.) Clairv., seed. — 5. *Scleranthus annuus* L., flower. — 6. *S. perennis* L., ovary, flower. — 7. *S. uncinatus* Schur, flower. — 8. *Thylacospium caespitosum* (Camb.) Schischk.

1. *M. physodes* (DC.) Fisch. ex Cham. et Schlecht., l. c. (1826) Fenzl in Ldb. Fl. Ross. I, 359; Kom., Fl. Kamch. II, 96. — *Arenaria physodes* DC. Prodr. I (1824) 413.

Perennial; stems prostrate, ascending, 7–15 cm long; leaves 1–1.5 cm long and 0.5–1.7 cm broad, opposite, oval or ovate, mucronate, narrowing toward base to short petiole; upper leaves sparsely pubescent on the margin and on the lower side of the midrib; flowers solitary at the ends of stems and of branches; pedicels 1–1.5 cm long, glandular-pubescent; sepals 4–6 mm long, oblong or ovate, spatulately narrowing to a petiole; filaments subulate-filiform, exceeding petals; ovary incompletely 3-loculed, with central placentation; mature capsule 0.5–1 cm in diameter, breaking up into 3 inflated subcoriaceous cells, each with a deep longitudinal furrow and containing a few seeds; seeds dark red or brown, subpyriform, flattened. Fl. and fr. July–August. (Plate XXXI, Figure 1).

Sandy seashores, river shallows, and rarely dry meadows. — Arctic: Arc. E. Siberia to the Lena estuary, Chuk., An.; E. Siberia: NE part of Lena-Kol. (Kolyma River); Far East: Kamch., Sakh. (?). Endemic. Described from Merck's specimens collected in Kamchatka.

Genus 475. **THYLACOSPERMUM** * FENZL

Fenzl in Endl. Gen. pl. (1840) 967. — *Driandra* Cambess. in Jacq. Voy. Bot. (1836–39) 27, non DC. — *Flourensia* Camb., l. c., tab. 29, non DC. — *Bryomorpha* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 142. — *Thylacosperma* Lindl. Veg. Kingd. (1847) 498.

Calyx of 5 sepals united at base, turbinate; petals 5, entire; stamens 10, adnate to sepals, with minute glands at the base of filaments; styles 3; capsule compressed-globular, attenuate toward base, unilocular, dehiscing by 6 teeth; seeds reniform.

- 546 1. *T. caespitosum* (Camb.) Schischk. in Sched. ad Herb. Fl. Ross. IX (1932) 90. — *Periandra caespitosa* Camb. in Jacquem. Voyages dans l'Inde (1836–39) 27. — *Flourensia caespitosa* Camb. ibid., tab. 29. — *Bryomorpha rupifraga* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 780. — *Thylacospermum rupifragum* Schrenk, Enum. pl. nov. II (1842) 53. — *Arenaria rupifraga* Fenzl in Ldb. Fl. Ross. I (1842) 780. — Ic.: Camb. l. c., tab. 29. — Exs.: HFR no. 2972.

Perennial, glabrous, densely pulvinate; stems profusely branched at base, woody, densely covered with imbricate leaves; leaves ovate, 2–3.5 mm long and 2–2.5 mm broad, short-acuminate, thickened at apex and along the margins, those of sterile stems longer, ovate-lanceolate; flowers solitary, terminal, subsessile, enveloped by uppermost leaves; calyx tubular at base, the ovate acutish teeth broadly scarious-margined; petals greenish-white, oblong, shorter than calyx; capsule shining; seeds 6. June–July. (Plate XXXI, Figure 8).

Rock crevices in the alpine zone. — Centr. Asia: Dzu.-Tarb., T. Sh. Gen. distr.: Dzu.-Kash., Ch., Ind.-Him. Described from the upper reaches of the Yurpo River (India, Kanoar). Type in Paris.

Economic importance. The woody pulvinate mats are sometimes used for fuel.

* From Greek *thylacos*, sac, and *sperma*, seed.

Tribe 2. **SCLERANTHEAE** Vierh. in Oesterr. botan. Zeitschr. XVII (1907) 41, 91. — **Scleranthae** St. Hil. in Bull. Soc. philom. (1815) 38, ex parte. — **Paronychiae-scleranthae** Juss. in Mém. Mus. Paris II (1815) 386, ex parte. — **Apetalae-scleranthae** Link, Enum. I (1821) 417. — **Caryophylleae-scleranthae** Endl. Gen. (1840) 962. — **Scleranthoideae** Lüders. in Engl. bot. Jahrb. XL, Beibl. 91 (1907) 4. — Petals none; ovary 1-ovuled; styles 2; micropyle directed upward.

Genus 476. **SCLERANTHUS** * L.

L. Sp. pl. (1753) 406; Gen. pl. ed. 5 (1754) 190.

47 Calyx campanulate, 5-cleft to the middle; sepals acute or obtuse, with white scarious margin, the lower part indurated around the fruit and shed with it; petals none; stamens 10 or fewer, the filaments subulate, the anthers round; styles 2, filiform, stigmas capitate or claviform; fruit 1-seeded, indehiscent [utricle]; seeds lenticular, smooth, with a thin testa; embryo horseshoe-shaped, with radicle pointing upward. Annuals and perennials, with a short stem and opposite linear or setaceous exstipulate leaves. Russian name: Divala.

1. Perennial; sepals obtuse, slightly exceeding filaments, connivent in fruit 1. *S. perennis* L.
- + Annual; sepals acute, 2–4 times as long as filaments, divergent in fruit 2.
2. Calyx 2–2.5 mm long; stems 3–8 cm long 3. *S. polycarpus* L.
- + Calyx ca. 4 mm long; stems 5–15 cm long 3.
- + Sepals hooked at apex 4. *S. uncinatus* Schur.
3. Sepals not hooked at apex 2. *S. annuus* L.

Subgenus 1. **EUSCLERANTHUS** Pax in Nat. Pfl. III, 1 b. (1889) 92. —

Inflorescence a panicle composed of numerous cymes with glomerate flowers.

1. *S. perennis* L. Sp. pl. (1753) 406; Fenzl in Ldb. Fl. Ross. II, 157; Shmal'g., Fl. II, 355. — Ic.: Hegi, III, Fl. Mittel.-Eur. III, t. 108. — Exs.: HFR no. 836.

Perennial; stems several, ascending or erect, 5–20 cm long, branched from bases, covered with short crisp hairs or sometimes glabrate; leaves linear-subulate, convex beneath, flat above, semiterete, 6–10 mm long, acute, grayish-green, glabrous, connate and sparsely ciliate at base, often with axillary leaf clusters; flowers sessile in dense terminal cymes; calyx commonly glabrous, more rarely sparsely pubescent; sepals oblong, obtuse, with white scarious margins, connivent in fruit; stamens at anthesis about equaling calyx, commonly all 10 fertile; fruit glabrous or slightly pubescent, (3)4–5 mm long. June–August. (Plate XXXI, Figure 6).

Meadows, open woods, plowed fields, and roadsides, often on sandy soil. — European part: Lad.-Ilm., Dv.-Pech. (?), U. V., V.-Kama (W. part), U. Dnp., M. Dnp., V.-Don, Bl. (?), Crim. (very rarely-Karadag); Caucasus: E. Transc. (Abastuman, Oshorskii Range). Gen. distr.: Centr. and Atl. Eur., W. Med., Bal., Arm.-Kurd. (Sarykamysh). Described from Europe. Type in London.

* From Greek *scleros*, hard, and *anthos*, flower.

2. *S. annuus* L. Sp. pl. (1753) 406; Shmal'g., Fl. II, 355; Kryl., Fl. Zap. Sib. V, 1044. — *S. annuus* β *cymosus* Fenzl in Ldb. Fl. Ross. II (1844–46) 157. — *S. tauricus* Presl ex Knaf in Oesterr. bot. Zeitschr. XXII (1872) 187. — Ic.: Hegi, Ill. Fl. Mittel.-Eur. III, t. 108.

548

Annual or biennial; stems solitary or several, 5–15 cm long, erect or prostrate, branched from the base, the internodes usually with 1-sided pubescence; branches pubescent on 2 sides; leaves narrowly linear to almost subulate, 6–8 mm long, acute, glabrous or puberulent, shortly connate in pairs and ciliate at base, often with axillary leaf clusters; flowers sessile, in terminal and axillary glomerules; calyx campanulate, glabrous, 3.5–4 mm long; sepals lanceolate, acute, narrowly scarious-margined, more or less divergent in fruit; stamens 10, much shorter than calyx, 2–5 fertile, the others sterile; fruit ovoid, 3 mm long and 1.3 mm broad, glabrous or slightly pubescent. April–September. (Plate XXXI, Figure 5).

Cultivated and old fields, exposed slopes, roadsides, and sandy places. — European part: all regions except Kar.-Lap. and L. V.; Caucasus: all regions except the alpine zone. Gen. distr.: Scand., Centr. and Atl. Eur., Med., Bal.-As. Min., N. Afr., N. Am. (introduced). Described from Europe. Type in London.

Economic importance. Sometimes developing as a weed forming a solid cover in plowed fields and thus causing serious damage to crops.

3. *S. polycarpus* L. Cent. pl. II (1756) 16. — *S. collinus* Hornung ex Opiz, Naturalientausch X (1825) 242. — *S. verticillatus* Tausch in Flora XII, 1 Ergbl. (1829) 50; Shmal'g., Fl. II, 355. — *S. annuus* α *verticillatus* Fenzl in Ldb. Fl. Ross. II (1844–46) 156. — *S. annuus* β *polycarpus* Čelak. Prodr. Fl. Böhm. (1875) 487. — Ic.: Cousin et Ansberge, Herb. Fl. Trans. IX (1868) t. 23. — Exs.: Pl. exsic. Austr.-Hung. no. 570.

Annual; stems erect or at base ascending, 3–10 cm long, short-branched, puberulent; leaves linear-subulate, semiterete with convex lower and flat upper surface, slightly dilated and ciliate at base, more or less arched-recurved, 0.7–1 cm long and 0.5–1 mm broad, usually surpassing corresponding internodes; flower glomerules subsessile, disposed in a spiciform or rather loosely paniculate inflorescence; calyx 2–2.5 mm long, rounded at base, glabrous; sepals lanceolate, acute, very narrowly scarious-margined, shorter than the united perigynous zone of calyx, suberect in fruit, slightly divergent; fertile stamens 3–5, half as long as sepals. May–June.

Dry stony slopes. — Caucasus: Cisc., Dag., W., E., and S. Transc. Gen. distr.: Scand., Med., Bal.-As. Min., N. Afr. Described from Europe. Type in London.

4. *S. uncinatus* Schur in Verh. Siebenb. Ver. Naturw. I (1850) 107, 108, nom. nud.: II (1851) 10; Boiss. Fl. Or. I, 750. — *S. annuus* β *cymosus* Fenzl in Ldb. Fl. Ross. II (1844) 157, ex parte. — *S. annuus* var. *uncinatus* Boutigny in Bull. Soc. Bot. France II (1855) 768. — Ic.: Coste, Fl. Franc. II (1903) 105. — Exs.: HFR no. 1112.

549

Annual; stems commonly several, branched from base, 5–10 cm long, often with pubescence confined to one side and consisting of simple hairs sometimes interspersed with glandular ones; leaves linear, acuminate, ciliate at somewhat dilated base; flower heads mostly terminal; calyx ca. 4 mm long, elongating in fruit to 5–6 mm, pubescent; sepals lanceolate, uncinately incurved at apex, divergent in fruit, longer than the calyx tube; stamens ca. 1 mm long. May–June. (Plate XXXI, Figure 7).

Exposed grassy slopes and roadsides; rising in mountains up to 3,000 m.—Caucasus: Gr. Cauc., E., W., and S. Transc. Gen. distr.: W. and E. Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from Transylvania.

Subfamily 2. **Paronychioideae** VIERH. in Oesterr. Bot. Zeitschr. LVII (1907) 96. — Paronichieae A. St. Hil. in Bull. Soc. Philom. (1815) 38; Fenzl. in Endl. Gen. pl. (1840) 956. — Illecebraceae Hook. f. in Benth. et Hook. f. Gen. II (1880) 12, ex parte. — Sepals distinct or slightly connate; staminodes often present; leaves stipulate.

Key to Tribes

1. Fruit mostly many-seeded, dehiscent as a rule by apical teeth 2.
- + Fruit nutlike, mostly 1-seeded, indehiscent, rarely breaking up at base 4.
2. Styles united in lower part 3. Polycarpeae.
- + Styles distinct from base 3.
3. Ovary 1-loculed; leaves opposite or spuriously verticillate 1. Sperguleae.
- + Ovary 3- or 4-loculed at base; leaves alternate or some opposite 2. Telefieae.
4. All flowers alike; ovules 1–4 4. Paronychieae.
- + Central flower of the 3-flowered ultimate dichasia larger than the other two; ovule 1 5. Pterantheae.

Tribe 1. SPERGULEAE Vierh. in Oesterr. Bot. Zeitschr. LVII (1907) 96. — Alsineae-sperguleae Gren. et Godr. Fl. Franc. I (1848) 274. — Paronychieae-sperguleae Bartl. in Bartl. et Wendland, Beitr. II (1825) 158.

Sepals distinct; styles distinct from base; fruit a 1-loculed many-seeded capsule, dehiscent by teeth; stipules small, dry, scarious.

50 Key to Genera

1. Leaves in spurious whorls; carpels and styles 5 477. *Spergula* L.
- + Leaves opposite; carpels and styles 3 2.
2. Sepals narrowly scarious, obtuse; petals mostly pink or red. 478. *Spergularia* L.
- + Sepals broadly scarious, acute; petals always white . . . 479. *Alsine* L.

Genus 477. **SPERGULA** * L.

L. Gen. pl. ed. I (1737) 133; ed. 5 (1754) 199.

Sepals 5; petals 5, entire; stamens 10, rarely 5–7; styles 5; ovary 1-loculed, containing numerous ovules; capsule dehiscent by 5 valves; seeds

* From *spargere*, to scatter, alluding to the weak stems and branches spread out over the soil surface; or from the German name of the plant, *Spergel*, *Spark*.

numerous, with a narrow or broad wing-margin; leaves linear, in spurious whorls, with whitish scarious stipules at base. Annual herbs, sometimes overwintering, branched from base; pedicels long, recurved after anthesis. Russian names: toritsa, shpergel'.

1. Leaves channeled beneath; seeds biconvex (lenticular), with a very narrow smooth wing-margin 2.
- + Leaves not channeled beneath; seeds flat, with radiate-furrowed wing 5.
2. Seeds ca. 1 mm in diameter; leaves and stems glandular-pubescent; plants usually up to 40 cm high, infesting various crops 3.
- + Seeds 1.8 mm in diameter; leaves and stems glabrous or slightly glandular-pubescent; plants 60–100 cm high, occurring only in flax fields 4.
3. Seeds without papillae, glabrous, finely puncticulate, surrounded by a conspicuous pale wing-margin; only occasional seeds papillose 2. *S. sativa* Boeningh.
- + Seeds covered with short claviform papillae, the narrow brownish wing-margin inconspicuous 1. *S. vulgaris* Boeningh.
4. Seeds without papillae, glabrous, surrounded by a rather broad pale wing-margin 4. *S. linicola* Boreau.
- + Seeds papillose, surrounded by a narrow brownish inconspicuous wing-margin 3. *S. maxima* Weihe.
- 551 5. Petals oval, obtuse, overlapping; stamens commonly 10; seeds with brownish wing half as broad as the body 5. *S. vernalis* Willd.
- + Petals lanceolate, acute, not overlapping; stamens 5; seeds with white wing as broad as the body 6. *S. pentandra* L.

Series 1. *Arvenses* Schischk. — Seeds biconvex, with a narrow smooth wing-margin; leaves channeled beneath.

1. *S. vulgaris* Boeningh. Prodr. Fl. Monast. (1824) 135; Rupr. Fl. ingr. (1860) 190; N. Zinger in Tr. Bot. Muz. Ak. Nauk VI (1909) 240–252. — *S. arvensis* β *S. vulgaris* Mert. u. Koch, Deutschl. Fl. III (1831) 360; Shmal'g., Fl. I, 147. — *S. arvensis* var. *vulgaris* Fleisch. et Lindem. Fl. d. Ostseeprov. (1839) 163; Fenzl in Ldb. Fl. Ross. II, 170; Kryl., Fl. Zap. Sib. V, 1039. — *S. arvensis* β *trachysperma* Neilr. Fl. Nied.-Oesterr. (1859) 781.

Annual; stems several, 15–40 cm long, erect or ascending, usually with 4 internodes, branched from the middle, glandular-pilose as are the leaves and often viscous; leaves filiform, convex above, channeled beneath, 2–3 cm long; bracts small, scarious or merely scarious-margined; pedicels filiform, many times as long as calyx; sepals ovate, obtuse, nerveless, glandular-pilose, 3–4 mm long; petals oval, obtuse, slightly longer than calyx; capsule broad-ovoid, slightly exceeding calyx; seeds covered with short claviform whitish papillae, surrounded by a narrow inconspicuous whitish wing-margin, ca. 1.1 mm in diameter. June–July. (Plate XXXII, Figure 5).

Sandy places, plowed fields, among crops, near dwellings, and roadsides. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U. Dnp.,

M. Dnp., V.-Don; Caucasus: Cisc. (Ordzhonikidze, Mt. Kaishaur); W. Siberia: Ob, U. Tob., Irt., E. Siberia: Ang.-Say.; Far East: Uss., Sakh. Gen. distr.: almost throughout W. Eur., Bal.-As. Min., N. Afr., Ind.-Him., Jap.-Ch., N. Am. Described from Westphalia.

Economic importance. Wherever it occurs in large concentrations, the plant may be used as forage. The chemical dry weight composition is as follows: nitrogen 2.36%, phosphoric acid 1.08%, potassium 4.21%, calcium 1.52%.

2. *S. sativa* Boeningh. Prodr. Fl. Monast. (1824) 135; Rupr. Fl. ingr. (1860) 190; N. Zinger in Tr. Bot. Muz. Ak. Nauk VI (1909) 240–252. — *S. arvensis* α *sativa* Mert. u. Koch, Deutsche Fl. III (1831) 360; Shmal'g., Fl. I, 147. — *S. arvensis* α *sativa* Rchb. Fl. Germ. exc. (1832) 567; Fenzl in Ldb. Fl. Ross. II, 169; Kryl., Fl. Zap. Sib. V, 1039. — *S. arvensis* β *leiosperma* Čelak. Sitzb. Böhm. Ges. Wiss (1881) 30.

552 Annual; stems and leaves as in the preceding species; seeds ca. 1 mm in diameter, minutely punctulate, with a conspicuous white wing-margin. June–July. (Plate XXXII, Figure 6).

On cultivated soil and near dwellings. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don; W. Siberia: Ob, U. Tob., Irt.; E. Siberia: Lena-Kol. Gen. distr.: nearly throughout W. Europe. Described from Westphalia.

3. *S. maxima* Weihe in Arch. Deutsch. Apoth. Ver. VIII (1824) 51 et in Boeningh. Prodr. Fl. Monast. (1824) 136; Weinm. Enum. Stirp. in agro Petrop. sp. cresc. (1837) 49; Rupr. Fl. ingr., 190; N. Zinger in Tr. Bot. Muz. Ak. Nauk. VI (1909) 252–263. — *S. arvensis* γ *maxima* Mert. u. Koch, Deutschl. Fl. III (1831) 360; Shmal'g., Fl. I, 147. — *S. arvensis* var. *maxima* Koch, Syn. ed. 2 (1843–45) 120; Fenzl in Ldb. Fl. Ross. II, 170; Kryl., Fl. Zap. Sib. V, 1039. — *Alsine arvensis* var. *maxima* G. F. W. Mey. Chloris Hannov. (1836) 208. — *S. arvensis* A. vulgaris 1. *maxima* Asch. u. Graebn. Synops. V, 1 (1919) 818, ex parte.

Annual; stems, like the leaves, commonly glabrous, more rarely sparsely glandular-pilose, simple or branched, 40–100 cm long; radical leaves 6–8 cm long and 1 mm broad, the cauline shorter and narrower, convex above, channeled beneath; inflorescence branches, pedicels and calyx glandular-pilose or glabrous; sepals ovate, obtuse, nerveless; petals slightly longer than calyx, oval, obtuse; stamens 10; seeds lenticular, 1.8 mm in diameter, with whitish papillae and a narrow brownish wing-margin. June–July. (Plate XXXII, Figure 7).

Flax fields. — European part: Lad.-Ilm., U. Dnp., U. V., V.-Kama; W. Siberia: Irt.; Far East: Uss. Gen. distr.: Centr. Eur. Described from Westphalia.

Economic importance. A frequent weed of flax fields. Spreading with flax seed into new regions of the USSR.

4. *S. linicola* Boreau in Mémoires de la Société acad. d'Angers, XX (1865) 14; N. Zinger in Tr. Bot. Muz. Ak. Nauk. VI (1909) 263–270; B. Shishkin in Fl. Yugo-Vost. IV, 270. — *S. arvensis* var. *linicola* A. Schwarz, Fl. Nürnberg. Ed. II (1897) 126; Kryl., Fl. Zap. Sib. V, 1039. — *S. praevisa* Zing. in Acta Hort. bot. Univ. Jurjev. VII (1906) 85 et in Fedde Repert. XI, 193. — *S. arvensis* β *sativa* II. *praevisa* Asch. et Graebn. Synops. V, I (1919) 821. — *S. arvensis* A. vulgaris I *maxima* b. *linicola* Asch. et Graebn., l. c., 818.



PLATE XXXII. 1. *Telephium oligospermum* Steud., flower. — 2. *T. orientale* Boiss., flower. — 3. *Spergula linicola* Boreau, seed. — 4. *Alsine segetalis* L., flower, seed. — 5. *Spergula vulgaris* Boeningh., seed. — 6. *S. sativa* Boeningh., seed. — 7. *S. maxima* Weihe, seed.

Annual; stems 40–120 cm long, commonly glabrous as are the leaves, more rarely sparsely glandular-pilose, commonly branched, with 7–9 internodes; radical leaves 6–8 cm long and 1 mm broad, the cauline somewhat shorter and narrower, convex above, channeled beneath, glabrous or scarcely pubescent; inflorescence branches, pedicels and calyx more or less glandular-pilose, sometimes glabrate; sepals ovate, obtuse, 3.5 mm long; petals 4 mm long, ovate, obtuse; fruit an indehiscent broad-ovoid, utricle, slightly exceeding calyx; seeds lenticular, 1.8 mm in diameter, smooth, with a rather broad whitish wing-margin. June–July. (Plate XXXII, Figure 3).

Exclusively in flax fields. — European part: Lad.-Ilm., U. Dnp., U. V., V.-Kama. Gen. distr.: Centr. and Atl. Eur. Described from France.

Economic importance. A troublesome weed of flax; spreading together with this crop from the western flax-growing regions eastward (as far as Perm).

Series 2. *Vernales Schischk.* — Seeds flat, with radiate wing; leaves not channeled.

5. *S. vernalis* Willd. Fl. Berol. Prodr. (1787) 157; Shmal'g., Fl. I. 147. — *Arenaria pentandra* Wallr. Sched. crit. (1822) 206. — *Spergula pentandra* Fenzl in Ldb. Fl. Ross. II, 169, ex parte. — *S. Morisonii* Boreau in Duchartre Rev. Bot. II (1847) 424. — *S. pentandra* β *morisonii* Döll. Fl. Bad. (1862) 1217. — Exs.: Pl. Finland. exsicc. no. 643.

Biennial, almost glabrous throughout, grayish-green; stem 7–30 cm long, simple or branched, erect or at base ascending; leaves not channeled beneath, linear, 0.5–1 cm long and 7.5 mm broad, much shorter than internodes; stipules minute; sepals ca. 3 mm long, the outer lanceolate and acute, the inner ovate and obtuse; petals white, ovate, overlapping; stamens 10, more rarely 6–8; capsule slightly exceeding calyx; seeds smooth at center, punctate and whitish-tuberculate on periphery, the brownish wing half as broad as the body. June–July. (Plate XXXIII, Figure 1).

Sandy slopes, pinewoods, and roadsides. — European part: Lad.-Ilm., U. Dnp. Gen. distr.: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.?, N. Afr. Described from the vicinity of Berlin. Type in Berlin.

6. *S. pentandra* L. Sp. pl. (1753) 440; Fenzl in Ldb. Fl. Ross. II, 169, ex parte; Shmal'g., Fl. I, 147. — *Alsine marginata* Schreb. Spic. Fl. Lips. (1771) 31. — *Stellaria pentandra* Scop. Fl. Carn. ed. 2, 1 (1772) 318. — *Alsine pentandra* Crantz, Instit. II (1766) 408. — *Arenaria media* Poll. Hist. pl. Palat. I (1776) 433. — *Spergularia pentandra* G. Don, Gen. Syst. I (1831) 425. — *Spergula arvensis* β *marginata* Moris, Fl. Sard. I (1837) 281. — *S. arvensis* β *pentandra* Wirzen, Prodr. Fl. Fenn. (1843).

Annual; stem 5–15 cm long, simple or branched, erect or at base ascending, glabrous or at summit glandular-pubescent; leaves as in the preceding species; sepals ca. 3 mm long, the outer lanceolate acute, the inner ovate obtuse; petals white, lanceolate, acute, not overlapping, shorter than calyx; stamens 5, rarely more; capsule slightly exceeding calyx; seeds smooth, not tuberculate on periphery, the snow-white wing as broad as the body. June–July.

Pinewoods and sandy places. — European part: ? U. Dnp. **Gen. distr.:**
W. Med., Atl. Eur., Bal. Described from Europe. Type in London.

Genus 478. **SPERGULARIA** * (PERS) J. et C. PRESL **

J. et C. Presl, Fl. Cech. (1819) 94. — Buda Adans. Fam. II (1763) 507. — Tissa Adans., l. c. — Stipularia Haw. Syn. Pl. succulent. (1812) 107. — Lepigonum Wahlb. Fl. Gothoburg. (1820) 45. — Arenaria sect. Spergularia Pers. Synops. I (1805) 504.

Flowers in loose inflorescences or in cymes; sepals 5, herbaceous, obtuse, scarious-margined; petals 5, entire, white or red; stamens 2–5, more rarely 10; styles 3, sometimes 4; capsule dehiscent by 3 valves; seeds small, trigonous-ovoid. Annual or perennial small herbaceous plants; leaves opposite, linear, narrowly linear, or filiform; stipules minute, connate in pairs, scarious. Russian name: torichnik.

1. All seeds in capsule with a broad membranous wing; capsule 1.5–2 times as long as calyx; stamens 10 1. **S. marginata** (DC.) Kitt.
- + All seeds wingless or only those at base of capsule winged; capsule equaling or slightly exceeding calyx; stamens 2–5 2.
2. Calyx 1.5–2.5 mm long; pedicel slender, 2–6 times as long as calyx; seeds sharply tuberculate; leaves narrowly linear to filiform, obtuse 2. **S. diandra** (Guss.) Heldr. et Sart.
- + Calyx 3–6 mm long; pedicels as long as or slightly longer than calyx; seeds smooth or bluntly tuberculate; leaves linear, subacute . . 3.
3. Capsule equaling or shorter than calyx; seeds wingless; fruiting pedicels 2–3 times as long as calyx; stipules ovate-lanceolate, lustrous; stamens 5–10 3. **S. campestris** (L.) Aschers.
- + Capsule exceeding calyx; seeds wingless or the lower ones in capsule winged; pedicels not longer than calyx; stipules broad-ovate, not lustrous; stamens 2, more rarely 3–10 4. **S. salina** Presl.

557

1. **S. marginata** (DC.) Kitt. Taschenb. der Fl. Deutsch. ed. 2 (1844) 1004; Boiss. Fl. Or. I, 733; Shmal'g., Fl. I, 148; Grossg., Fl. Kavk. II, 399. — Arenaria (Spergularia) media Pers. Syn. I (1805) 504, non L. — Stipularia marina Haw. Syn. pl. succulent. (1812) 104. — Arenaria marginata DC. Fl. Franc. V (1815) 793. — Lepigonum marinum Wahlb. Fl. Gothob. (1820–24) 45. — Spergularia media Presl, Fl. Sic. (1826) XVII. — Buda media Dumort. Fl. Belg. (1827) 110. — Alsine marginata Rchb. Fl. Germ. exc. (1830–32) 566. — A. marginata C. A. M. Verz. Pfl. Cauc. (1831) 217. — Lepigonum marginatum Koch, Flora XXIV, 2 (1841) 505; Syn. Fl. germ. ed. 2 (1843) 121. — Spergularia media β marginata Fenzl in Ldb. Fl. Ross. II (1844) 168. — Ic.: Lindman, Bild. Nord. Fl. (1901–05) t. 349a; Hegi Fl. Mitt.-Eur. III (1909) t. 108, f. 2a–2f. — Exs.: H. F. A. M. (1928) no. 465; Fl. exsic. Austro-Hungarica no. 3639.

Perennial, rather large, glandular-pubescent at summit; stem branched, erect or ascending, 15–30 cm long; leaves linear, semiterete, fleshy, 1–4 cm long and 1 mm broad; stipules elongate-lanceolate, acute, connate at base; flowers in a racemiform almost leafless inflorescence; pedicels longer than

* For name derivation see under Spergula, p. 421.

** Treatment by S. G. Gorshkova.

and often 2–3 times as long as calyx; sepals lanceolate or oblong-ovate, mostly acutish, narrowly scarious-margined, 5–7 mm long and 1.5–2 mm broad; petals red, more rarely white, oblong, as long as or slightly longer than calyx; seeds round, smooth or slightly tuberculate, with a broad membranous wing. May–October. (Plate XXXIII, Figure 3).

Seashores, saline soils (solonetz and solonchak). – European part: Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., E. and W. Transc.; Centr. Asia: Ar.-Casp., Kyz. K., Kara K., Mtn. Turkm., Amu D., Syr D., Pam.-Al. **Gen. distr.:** Scand., Centr. Eur. Described from France. Type in Paris.

2. *S. diandra* (Guss.) Heldr. et Sart. in Heldr. Herb. Graec. norm. (1855) no. 492, no. 1124; Boiss. Fl. Or. I, 733; Kryl., Fl. Zap. Sib. V, 1040; Grossg., Fl. Kavk. II, 399. – *Arenaria diandra* Guss. Fl. Sicul. Prodr. I (1827) 515. – *A. salsuginea* Bge. in Ldb. Fl. Alt. II (1830) 167. – *Alsine rubra* C. A. M. Verz. Pfl. Cauc. (1831) 217 (non Crantz). – *Lepigonum salsugineum* Fisch. et Mey. Ind. sem. Horti Petrop. I (1835) 10. – *Alsine diandra* Guss. Fl. Sic. Syn. I (1842) 501. – *Spergularia salsuginea* Fenzl in Ldb. Fl. Ross. II (1844) 166. – Ic.: Ldb. Ic. pl. Fl. Ross. V, t. 409 (*Arenaria salsuginea*); Bonnier Fl. Compl. France, Suisse, Belg. II (1913) t. 91 (*S. salsuginea*). – Exs.: Herb. Fl. cauc. no. 310 et no. 310b; H. F. A. M. no. 464a, 464b.

Annual, covered throughout with short glandular hairs, occasionally almost glabrous; stems branched, erect or sometimes prostrate, slender, 5–15 cm long; leaves narrowly linear to filiform, obtuse, subterete, 0.5–2 cm long, 1/3–1/2 mm broad; stipules scarious, broadly triangular, acute, united for one-third to half their length; flowers small, in loose racemiform cymes; pedicels slender, 2–6 times as long as calyx, slightly divergent; sepals oblong-ovate, obtuse 1.5–2.5 mm long and 1 mm broad, with a white scarious margin; petals pink, oblong-elliptic, shorter than calyx; stamens 2 or 3; capsule ovoid, equaling or slightly exceeding calyx; seeds small, almost black, wingless, sharply tuberculate or smooth (var. *leiosperma* M. Pop.). May – August. (Plate XXXIII, Figure 2).

Damp solonetz meadows, solonchaks, and lakeshores. – European part: L. V.; Caucasus: E. and S. Transc.; W. Siberia: U. Tob., Irt., Alt; Centr. Asia: Ar.-Casp., Balkh., Kara K., Mtn. Turkm., Amu D., Syr D., Pam.-Al., T. Sh. **Gen. distr.:** Med., Bal.-As. Min., Iran. Described from Italy. Type in Naples.

3. *S. campestris* (L.) Aschers. Fl. Prov. Brandenb. II (1864) 94; Kryl., Fl. Zap. Sib. V, 1041. – *Arenaria rubra* var. *campestris* L. Sp. pl. (1753) 423. – *Alsine rubra* Crantz, Inst. II (1766) 407, ex p. – *Arenaria campestris* All. Fl. Pedem. II (1785) 114. – *Arenaria* (*Spergularia*) *rubra* Pers. Syn. I (1805) 504; Shmal'g., Fl. I, 148. – *Stipularia rubra* Haw. Syn. pl. succulent. (1812) 103. – *Spergularia rubra* J. et C. Presl, Fl. Cech. (1819) 94; Boiss. Fl. Or. I, 732. – *Lepigonum rubrum* Whlb. Fl. Gothoburg (1820–24) 45. – *Buda rubra* Dumort. Fl. Belg. (1827) 110. – *Spergularia rubra* var. *campestris* Fenzl in Ldb. Fl. Ross. II, 1 (1844) 167. – *Tissa campestris* Pax in Nat. Pflanzenf. III 1.B. (1889) 45. – Ic.: Hegi Illustr. Fl. vom. Mitt.-Eur. III (1909) 425, f. 622 a–c et t. 108 f. 1. – Exs.: The Unit. Stat. Nat. Herb. no. 408 (*Tissa rubra* (L.) Britton).



PLATE XXXIII. 1. *Spergularia vernalis* Willd., stem node, flower, seed. — 2. *Spergularia diandra* (Guss.) Heldr. et Sart., stem node, seed. — 3. *S. marginata* (DC.) Kit., flower, seed. — 4. *S. salina* J. et C. Presl, seed. — 5. *S. campestris* (L.) Aschers., seed.

Annual, biennial, or perennial; stem branched from base, prostrate or erect, to 20–25 cm long, in upper part glandular-pubescent; leaves flat, narrowly linear to filiform, mucronate, somewhat narrowing toward base, 5–15 cm long, 0.5–1 mm broad, glabrous or pubescent; stipules ovate-lanceolate, acuminate, silvery-lustrous, connate at base; flowers in leafy racemiform inflorescences; pedicels as long as or slightly longer than calyx, elongating in fruit to 2–3 times length of calyx; sepals lanceolate, broadly scarious-margined, glandular-pubescent, 3–4.5 mm long, 1.75 mm broad; petals pink, obovate, as long as or shorter than calyx; stamens 5–10; capsule ovoid, equaling or shorter than calyx; seeds small, triangular-ovate, wingless, finely tuberculate. May–October. (Plate XXXIII, Figure 5).

Sandy places by roadsides, fallows, glades, and saline soils. — European part: Kar. -Lap., Dv. -Pech., Lad. -Ilm., U. V., V. -Kama, U. Dnp., M. Dnp., V. -Don, Transv., L. V.; Caucasus: Cisc.; W. Siberia: U. Tob., Alt.; E. Siberia: Yenis., Ang. -Say.; Far East: Kamch., Sakh., Uss.; Centr. Asia: Ar. -Casp. **Gen. distr.:** Scand., Centr. Eur. Described from Europe. Type in London.

4. *S. salina* J. et C. Presl, Fl. Cech. (1819) 95; Shmal'g., Fl. I, 148; Kryl., Fl. Zap. Sib. V, 1041; Grossg., Fl. Kavk. II, 399. — *Arenaria rubra* var. *marina* L. Sp. pl. (1753) 423, ex parte. — *Stipularia media* Haworth, Syn. Pl. Suec. (1812) 103, ex parte. — *Lepigonum medium* Wahlb. Fl. Gothob. (1820) 45. — *Arenaria salina* Ser. in DC. Prodr. I (1824) 401. — *Buda marina* Dumort. Fl. Belg. (1827) 110. — *Arenaria halophila* Bge. in Ldb. Fl. Alt. II (1830) 162. — *Spergularia media* Presl, Fl. Sic. (1826) XVII, nomen. — *S. media* var. *heterosperma* Fenzl in Ldb. Fl. Ross. II (1844) 168. — *S. marina* Griseb. Spicil. Fl. Rumel. I (1843) 213. — *S. media* Boiss. Fl. Or. I (1867) 733. — Ic.: Hegi. Ill. Fl. Mitt. Eur. III (1909) 425, t. 108, f. 2; Ldb. Icon. Fl. Ross. V (1834) t. 414 (*A. halophila*). — Exs.: Fl. exs. Reipubl. Bohem. Sloven. no. 15; F. Schultz., Herb. norm. no. 2318; H. F. A. M. no. 466a and 466b.

Annual, biennial, or perennial, glandular-pubescent in upper part; stem more or less thickened, branched, decumbent, to 25–30 cm long, with ascending branches; leaves fleshy, linear, semiterete, subobtuse, the upper more or less acuminate, 5–30 mm long and 1–1.5 mm broad; stipules broad-ovate, acute, connate to the middle, not lustrous; flowers in rather dense racemiform inflorescences; pedicels not longer than calyx; sepals oblong-ovate, obtuse, 3–6 mm long, 1.5–1.75 mm broad, broadly scarious-margined; petals pink to almost white, oblong, shorter than calyx; capsule ovoid, exceeding calyx; seeds small, ovate, wingless or only at the base of capsule winged. May–October. (Plate XXXIII, Figure 4).

Solonchaks, solonetztes, seashores, banks of rivers and lakes, and slopes of loess gullies. — European part: Dv. -Pech., Lad. -Ilm., V. -Kama, M. Dnp., V. -Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., E. Transc., Tal.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Yenis (left bank of the Yenisei near Karin), Lena-Kol. (Vilyuisk), Ang. -Say. (near the villages of Bazheevskoe, Shcherbakova, and Tuttur), Dau. (Lake Gusinoe); Far East: Uda, Uss., Sakh.; Centr. Asia: Ar. -Casp., Balkh., Kyz. K., Mtn. Turkm.,

Amu D., Syr D., Pam.-Al. **Gen. distr.:** Dzū.-Kash., Jap.-Ch. (N. part), Mong., N. and S. Am. Described from Czechoslovakia. Type in Prague.

562

Genus 479. **ALSINE** * L.**

L. Sp. pl. (1753) 272; Gen. pl. ed. 5 (1754) 132. — *Delia* Dumort Fl. Belg. (1827) 110.

Flowers small; sepals 5, scarious, with a green keel; petals 5, white; stamens 10; styles 3; capsule dehiscent by 3 valves. Very small annual plants; leaves opposite, narrowly linear to subfiliform, with a pair of connate scarious stipules at base.

1. **A. segetalis** L. Sp. pl. (1753) 272. — *Arenaria segetalis* Lam. Fl. Franc. III (1793) 43. — *Delia segetalis* Dumort. Fl. Belg. (1827) 110. — *Spergularia segetalis* G. Don, Gen. Syst. I (1831–1838) 425; Shmal'g., Fl. I, 148. — *Lepigonum segetale* Koch, Syn. Fl. Germ. II (1845) 120. — *S. exilis* Fenzl in Ldb. Fl. Ross. II (1844) 166. — *S. semidecandra* Kittel. Taschenb. Fl. Deutschl. 2 (1844) 1094. — Ic.: Hegi Ill. Fl. Mittel-Eur. III (1909) 425 f. 622 h–q.

Annual, glabrous; stem slender, branched from base, erect, to 9–10 cm long; leaves filiform, mucronate, 3–10 mm long, 1/4–1/2 mm broad; stipules scarious, lacerate; flowers small, in a loose leafless inflorescence; pedicels 3–6 times as long as calyx; sepals ovate-oblong, half as long as calyx; capsule globular-ovoid, about equaling calyx; seeds very small, pyriform, finely tuberculate. May–June. (Plate XXXII, Figure 4).

Damp sandy places and steppes. — European part: L. Don, L. V.; Centr. Asia: Ar.-Casp. **Gen. distr.:** Centr. and Atl. Eur. Described from Europe (Paris). Type in London.

Tribe 2. **TELEFIEAE** DC. Prodr. III (1828) 305. — Sepals 5; ovary incompletely 3- or 4-loculed, many-ovuled; leaves alternate, stipulate.

Genus 480. **TELEPHIUM**† L.††

L. Gen. pl. ed. 5 (1754) 131.

Sepals 5, oblong-linear, keeled, ca. 3 mm long; petals 5, oblong to oblong-ovate, about as long as calyx; stamens 5; ovary 3-angled; styles 3, erect, short, caducous; capsule pyramidal, dehiscent by 3 valves; seeds rounded-reniform, somewhat flattened, punctate. Vernacular name: khlyabnik.

563

1. Leaves oblong-elliptic, sometimes oval, 1–1.4 cm long, 0.4–0.8 cm broad. 1. **T. orientale** Boiss.
- + Leaves linear to linear-lanceolate, acute, 3–4 cm long, 0.2–0.4 cm broad. 2. **T. oligospermum** Steud.

* From Greek *alsis*, grove; occurring in the writings of Dioscorides as the name of a plant associated with shaded groves.

** Treatment by S. G. Gorshkova.

† A plant name mentioned by Pliny and derived from the name of Telephos, king of Media.

†† Treatment by O. A. Murav'eva.

1. *T. orientale* Boiss. Diagn. Ser. I, X (1849) 11; Grossg., Fl. Kavk. II, 400. — *T. imperati* Ldb. Fl. Ross. II, 164, non L. — *T. imperati* var. *orientale* Boiss. Fl. Or. I (1867) 754; F. N. Williams in the Journ. of Bot. 44 (1906) 289. — Ic.: Tchih. As. Min. Bot. tab. 16.

Perennial, glaucescent, glabrous; taproot woody; stems several, simple, 8–28 cm long, leafy, woody at base; leaves alternate, oblong-elliptic and sometimes narrowing to a short petiole or oval and cuneate at base; stipules very small, scarious; flowers in dense capitate-corymbose terminal inflorescences; bracts leaflike; sepals oblong-linear, sometimes narrowly scarious-margined; petals as long as or slightly longer than calyx; filaments subulate; capsule trigonous-pyramidal, gradually tapering at the top, exceeding calyx by one-fourth its length. May–August. (Plate XXXII, Figure 2).

Dry stony slopes. — Caucasus: E. and S. Transc., Tal. Gen. distr.: E. Med., Bal.-As. Min., Iran. Described from Crete, Anatolia, Iran, and Talysh. Type in Geneva.

2. *T. oligospermum* Steud. ex Boiss. Fl. Or. I (1867) 754.

Perennial; stems to 46 cm long; differing from the preceding species chiefly in its linear to linear-lanceolate leaves which are 3–4 cm long and 0.2–0.4 cm broad; sepals narrower, linear, scarious-margined. (Plate XXXII, Figure 1).

Up till now known in the USSR from only a single location: Caucasus: S. Transc. (Alagez, forestry near the lower Kosh-bulak River. A walnut wood, on rocks, at an altitude of about 1,600 m, collected on 31 July, 1932, by E. A. and N. A. Bush). Gen. distr.: Arm.-Kurd. Described from Kurdistan (Qara Mountains). Type in Geneva.

Tribe 3. POLYCARPEAE DC. Prodr. III (1828) 383; Fenzl in Ldb. Fl. Ross. II, 165. — Ovary many-ovuled; capsule many-seeded, dehiscent by 3 valves; styles united in lower part; leaves stipulate.

64

Genus 481. **POLYCARPON*** LOEFL.

Loefl. Iter Hisp. (1758) 7; L. Syst. ed. 10 (1759) 881.

Sepals 5, narrowly membranous-margined, scarcely keeled, cucullate; petals 5; stamens 3; style 3-fid; capsule 3-valved; seeds ventrally flat, dorsally convex. Russian name: mnogoplodnik [from mnogo, many, and plod, fruit].

1. *P. tetraphyllum* L. Syst. ed. 10 (1759) 881; Fenzl in Ldb. Fl. Ross. III, 165; Boiss. Fl. Or. I, 735; Voron. in Fom. and Voron., Oprod. rast. Kavk. i Kryma II, 2, 188. — *Mollugo tetraphylla* L. Spec. pl. (1753) 89. — *Loefflingia caspica* S. G. Gmel. Reise III (1774) 310, t. 35, fig. 1. — *Polycarpon diphyllum* Cav., IC. II (1791) 40, t. 151, f. 1. — *Paronychia striata* DC. in Poir. Encycl. V (1804) 25. — Ic.: Gmel., l. c., t. 35.

Annual; stem branched from base or simple, 4–8 cm long, prostrate or ascending or erect, slightly angled, the angles scarcely scaberulous;

* From Greek poly, many, and carpos, fruit.

lower and upper leaves opposite, the median spuriously verticillate, 4–6 in a whorl, rarely nearly all leaves opposite (var. *diphyllum* (Cav.) DC.), oblong-spatulate, ovate, or obovate, 0.8–1.4 cm long and 2.5–3.5 mm broad, obtuse, mucronulate, abruptly narrowing at base to a short petiole, the margin roughened; stipules ovate-lanceolate, long-acuminate, silvery-lustrous; flowers in loose dichasia at the ends of stems and branches; bracts resembling the stipules; sepals ovate or lanceolate, 1.5–2 mm long, acuminate, scarious-margined; petals white, oblong, notched, half as long as calyx; capsule globose, shorter than calyx; seeds subtriangular, finely tuberculate. June–July.

Seaside and riverside sands. — Caucasus: W. Transc., Tal. **Gen. distr.:** Centr. and Atl. Eur., Med., Bal.-As. Min., Afr., S. Am. (introduced), Aust. (introduced), Jap.-Ch. Described from Europe. Type in London.

Tribe 4. **PARONYCHIEAE** Pax in Engl. u. Prantl, Die natürl. Pflanzenf. 1 Aufl. III 1 B. (1889) 88. — *Paronychioideae* Lüders in Engl. Bot. Jahrb. XL, Beibl. 91 (1907) 22.

Sepals 5; staminodes 5, filiform, or none; fruit 1-seeded, indehiscent.

Key to Genera

1. Sepals hooded; flowers surrounded by large membranous bracts 482. **Paronychia** Adans.
- + Sepals obtuse; large bracts wanting 483. **Herniaria** L.

565

Genus 482. **PARONYCHIA*** ADANS.

Adans. Famil. II (1753) 272; Juss. im Mém. Mus. Paris II (1815) 389.

Sepals 5, slightly convex on the back; petals filiform, shorter than calyx; stamens 10, of these 5 fertile and 5 sterile, inserted on a circular hypogynous disk; fruit 1-seeded, opening irregularly at base. Annual plants with membranous stipules and flowers crowded in dense capitate inflorescences. Russian name: prinogotovnik [derived from *nogot'*, nail].

1. Stems in lower part and leaves glabrous; leaves to 4 mm long; sepals straight, glabrous 1. **P. cephalotes** (M. B.) Bess.
- + Stems and leaves puberulent; leaves to 7 mm long; sepals reflexed at tips, pubescent 2. **P. kurdica** Boiss.

Section **EUNYCHIA** DC. Prodr. III (1828) 370. — Subgenus *Eunychia* Rouy et Foucaud, Fl. France XII (1910) 4. — Sepals all alike; style more or less 2-fid.

1. **P. cephalotes** (M. B.) Bess. Enum. Hort. Cremenec (1830) 4; Stev. in Bull. Soc. Nat. Mosc. XXIX, 3, 184; Boiss. Fl. Or. I, 743; Grossg., Fl. Kavk. II, 401. — *Illecebrum cephalotes* M. B. Fl. taur.-cauc. III (1819) 169. — *I. capitatum* M. B. Fl. taur.-cauc. I, 174, non L. quo ad pl. taur. —

* From Greek *para*, near, and *onych*s, nail, referring to its use in popular medicine as a cure for whitlow.

Paronychia capitata Ldb. Fl. Ross. II, 162, non Lam. — Exs.: HFR no. 17; Fl. Cauc. exs. no. 60.

Perennial, scarcely woody at base; stem 5–15 cm long, glabrous in lower part, puberulent above, branched; leaves lanceolate or oblong-elliptic, 2.5–4 mm long and ca. 1 mm broad, subacute, glabrous, ciliate on the margin, or sometimes the upper leaves pubescent beneath; stipules narrowly lanceolate, whitish-lustrous; flowers in dense heads 1–2 cm in diameter; bracts large, ovate, acutish, whitish-lustrous; sepals linear-lanceolate, 2–3 mm long, the outer slightly longer than the inner; fruit ovate, half as long as calyx; seed reniform, smooth, ca. 1 mm long. May–June. (Plate XXXIV, Figure 6).

Stony, often calcareous slopes, and stony steppes. — European part: Bl., Crim.; W. Transc. (Novorosiisk). **Gen. distr.:** N. part of the Balkan Peninsula. Described from the Crimea. Type in Leningrad.

566

Note. Early authors reported for Russia the species *P. capitata* (L.) Lam. and *P. argentea* Lam. As regards *P. argentea* Lam. it was already noted by Schmalhausen that this species had been reported instead of *P. cephalotes* (M. B.) Bess. Upon examination of ample herbarium material, we are in a position to exclude both these species from the USSR flora. The most easterly point of distribution of this plant [?] is Novorosiisk. Reports relating to the occurrence of this species in Armenia are erroneous and refer to *P. kurdica* Boiss.

2. *P. kurdica* Boiss. Diagn. ser. 1, 3 (1849) 10; Fl. Or. I, 744; Grossg., Fl. Kavk. II, 401. — *Illecebrum cephalotes* M. B. Fl. taur.-cauc. III, 169 quo ad pl. iberic. — *P. splendens* Stev. in Bull. Soc. Nat. Mosc. XXIX (1856) 184. — *P. nivea* C. A. M. Verzeichn. Pfl. cauc. 154, non DC. — *P. capitata* β *pubescens* Fenzl in Ldb. Fl. Ross. II (1844) 163. — Ic.: Grossh., Sosnov. et Schischk. Fl. Tiphlis. I, fig. 82, p. 199. — Exs.: Herb. Fl. cauc., no. 176; HFR no. 2973.

Perennial, scarcely woody at base; stems 2–10 cm long, ascending or prostrate, sparingly pubescent; leaves oblong-linear, 5–7 mm long and ca. 1 mm broad, subobtuse, puberulent; stipules lanceolate, scarious, ca. 3 mm long, white-lustrous; flowers short-pedicel, in dense clusters 0.5–1 cm in diameter; bracts large, oblong, acuminate; sepals linear-lanceolate, 2–3 mm long, the outer 1.5 times as long as the inner, pubescent. April–May. (Plate XXXIV, Figure 7).

Stony slopes. — Caucasus: E. and S. Transc., Tal. **Gen. distr.:** As. Min., Arm.-Kurd., Iran. Described from Kurdistan. Type in Geneva.

Genus 483. **HERNIARIA** * L.**

L. Sp. pl. (1753) 218.

Flower perfect or unisexual, small, in axillary clusters or in capitate-spiceform inflorescences; calyx green; corolla none or petals filiform and inserted as are the stamens on a hypogynous disk; stamens 2–5; style very short or wanting; stigma 2-partite; fruit dry, scarious, 1-seeded, enclosed in the persistent calyx; seed dark brown, smooth, shining. Perennial

* From Latin *hernia*, rupture, referring to the use of the plant to cure rupture.

** Treatment by O. A. Murav'eva.

or more rarely annual plants; stems prostrate; leaves small, with white-scarious ciliate stipules; bracts resembling stipules. Russian name: gryzhnik [from gryzha, rupture].

1. Sepals and stamens 4; style overtopping calyx. 5. **H. polygama** J. Gay.
 + Sepals 5; style obsolescent, very short, or wanting and then stigma sessile and 2-partite 2.
 2. Plants yellowish-green; leaves glabrous 3.
 + Plants grayish-green with whitish hairs 4.
 567 3. Stems woody, prostrate; sepals ciliate; utricle not surpassing calyx 2. **H. caucasica** Rupr.
 + Stems herbaceous, only at base sometimes woody; calyx glabrous throughout; utricle slightly exceeding calyx 1. **H. glabra** L.
 4. Perennial plants with a woody taproot and stems woody at base; calyx ovoid-ovaloid; stamens always 5 3. **H. incana** Lam.
 + Annual plants with a slender taproot; calyx narrower, oblong; stamens 2 or 3, very rarely 5 4. **H. hirsuta** L.

Section 1. **EUHERNIARIA** Williams in Bull. Herb. Boiss. IV (1896) 558. — Style very short or wanting; calyx lobes and stamens 5.

1. **H. glabra** L. Sp. pl. (1753) 317; Fenzl in Ldb. Fl. Ross. II, 159; Shmal'g., Fl. II, 354; Kryl., Fl. Zap. Sib. V, 1043. — Ic.: Fl. Yugo-Vost. IV, 274.

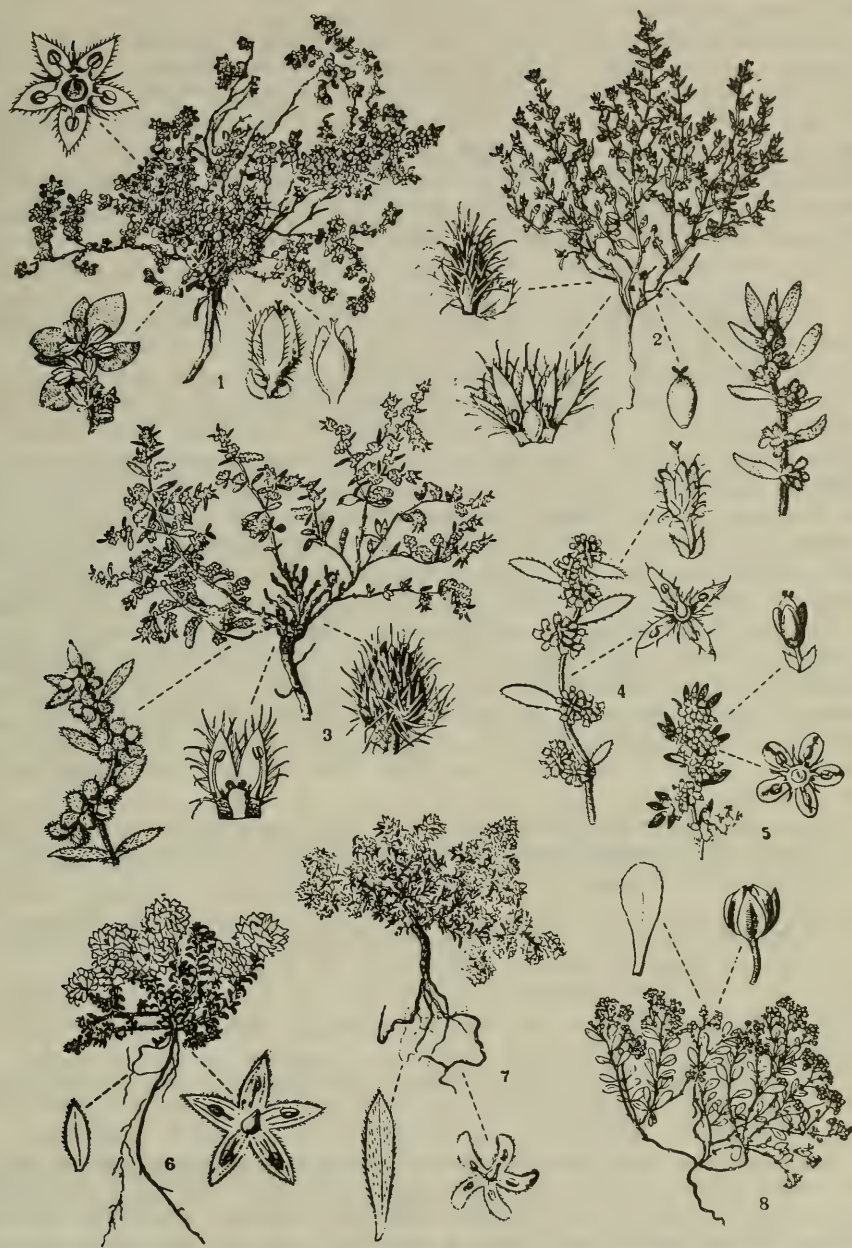
Perennial, 5–15 (to 22) cm high, yellowish-green, glabrous or more or less roughened with hairs (var. *scabriuscula* Fenzl); taproot woody; stems prostrate, sometimes woody at base, or ascending; leaves 2–7 mm long, 1–3 mm broad, oblong, elliptic, or obovate, narrowing at base to a petiole; stipules broad-ovate, ciliate; flowers sessile, in axillary clusters or in capitate-spiciform inflorescences; calyx lobes 5, obtusish; stamens 5; stigma sessile, 2-partite; utricle slightly exceeding calyx. Plants coumarin-scented when dry. May–August. (Plate XXXIV, Figure 5).

Exposed sandy places, roadsides, bluffs, and riverbanks. — European part: all regions except Arctic; Caucasus: W., E., and S. Transc., Tal.; W. Siberia: Ob (S. part), Irt., Alt.; Centr. Asia: Balkh., T. Sh., Dzu.-Tarb., Pam.-Al., Ar.-Casp., Kyz. K., Amu D. **Gen. distr.:** Scand., Centr. and Atl. Eur., W. and E. Med., Bal.-As. Min., Arm.-Kurd. Described from Europe. Type in London.

Economic importance. *H. glabra* (like *H. hirsuta* L.) contains a saponaceous glucoside herniarin, herniaria-saponin, coumarin, and the alkaloid paronychin. Exported in appreciable amounts.

2. **H. caucasica** Rupr. Fl. Cauc. I (1869) 241; Grossg., Fl. Kavk. II, 401.

- 568 A small undershrub, sometimes matted; stems woody, prostrate-decumbent but not rooting; young herbaceous stems puberulent, 5–15 cm long; leaves yellowish-green, glabrous (only initially sometimes ciliate), oval or obovate, 4–8 mm long, 2–3 mm broad, cuneately attenuate toward base; stipules ovate, with fringed-ciliate margins; flowers short-petioled, in axillary clusters; calyx with puberulent tube and 5 ciliate-margined lobes; stamens 5; style very short; utricle shorter than calyx. July–August. (Plate XXXIV, Figure 1).



PLATEXXXIV. 1. *Herniaria caucasica* Rupr.— 2. *H. hirsuta* L.— 3. *H. incana* Lam.— 4. *H. polygama* J. Gay.— 5. *H. glabra* L.— 6. *Paronychia cephalotes* (M.B.) Bess.— 7. *P. curdica* Boiss.— 8. *Polycarpon tetraphyllum* L.

Rocks and stony taluses in the alpine zone, rising to altitudes of about 2,500 m. — Caucasus: Dag., E. Transc.; W. Siberia: S. part of Alt.; Centr. Asia: Pam.-Al., T. Sh. Endemic. Described from the alpine zone of the Main Caucasus Range. Type in Leningrad.

Note. The studies of O. A. Murav'eva first established the occurrence of *H. caucasica* Rupr. in the alpine zone of the mountains of Soviet Central Asia and in the southern Altai. This is a fact of major significance as we know few plants with similar distribution area. More thorough botanical studies in recent times have tended to reduce the number of plants common to the mountainous areas of the Caucasus, Central Asia and Altai, with the emergence of new facts which often point to incorrect identification of Central Asian mountain plants with Caucasian.

(Editors)

3. *H. incana* Lam. Encycl. method. III (1789) 124; Fenzl in Ldb. Fl. Ross. II, 160; Shmal'g., Fl. II, 354. — *H. besseri* Fisch. ex Horn. Hort. Hafn. Suppl. (1819) 127. — *H. hirsuta* M. B. Fl. taur.-cauc. I, 179, non L.

Perennial, covered throughout with whitish hairs; taproot woody, much developed; stems 10–25 (30) cm long, profusely branched, woody at base, bushy; leaves 5–18 mm long, 1–3 mm broad, oblong-linear to narrowly elliptic (var. *angustifolia* Fenzl) or oval to obovate and narrowing toward base (var. *latifolia* Fenzl); stipules ovate or broad-ovate, ciliate; flowers in axillary clusters, these sometimes distinctly pedunculate; bracts small, resembling stipules; calyx lobes closed, sometimes slightly open, ovate-oval, densely covered with whitish sometimes uncinat hairs; sepals 5; utricle shorter than calyx. May–July. (Plate XXXIV, Figure 3).

Among mixed-grass steppe vegetation, on dry stony slopes, sometimes on chalk outcrops. — European part: M. Dnp., Bl., V.-Don, L. Don, Crim., Transv. (Urals); Caucasus: all regions, less frequently in W. Transc.; Centr. Asia: Mtn. Turkmen., Kara K., SW part of Ar.-Casp. Gen. distr.: Centr. Eur., W. and E. Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from France.

571

Note. Annual and biennial specimens of this species resemble in aspect *H. hirsuta* L. Useful distinguishing characters are provided in this case by the calyx and the number of stamens.

4. *H. hirsuta* L. Sp. pl. (1753) 317; Ldb. Fl. Ross. II, 160; Boiss. Fl. Or. I, 740, II, 354; Grossg., Fl. Kavk. II, 401; Kryl., Fl. Zap. Sib. V, 1043. — *H. cinerea* DC. Fl. Fr. Suppl. VI (1815) 375. — *H. diandra* Bge. in Del. sem. h. Dorp. (1843) no. 7. — Ic.: in Bauh. Hist. III, 379; DC. Mem. IV (1829) tab. 3 (*H. cinerea* DC).

Annual, grayish-green; taproot slender, poorly developed; stems 3–8 (rarely up to 15) cm long, prostrate at base, then ascending, branched from base, covered with short spreading whitish hairs; leaves 5–8 mm long, ca. 2 mm broad, oblong-linear to narrow-elliptic, gradually tapering toward base, rather densely pubescent, with ciliate margins; stipules oblong-ovate, ciliate, acute; flowers in approximate axillary clusters, especially on lateral branches; calyx lobes closed, oblong, densely covered with long spreading stiff hairs; sepals 5, the outer 2 mostly somewhat larger than the rest; stamens 2 or 3, very rarely 5; stigma sessile, 2-parted; utricle slightly

exceeding calyx. Plants to 5 cm high; stamens always 2 (var. *diandra* (Bge.) O. Mur.). April–August. (Plate XXXIV, Figure 2).

Gravelly and pebbly steppe loams, dry sandy slopes, fields, and field borders; sometimes rising in the mountains to 1,700 m. — Caucasus: Dag., E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm., S. part of Kara K., Amu D., Pam.-Al., Syr D., T. Sh. **Gen. distr.:** Centr. Eur., W. and E. Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from France. Type in London.

Note. A highly variable species, displaying differences in the following characters: 1) indument, responsible for color modifications ranging from grayish-green to cinereous; 2) plant stature, with height fluctuating between 3 and 15 cm, rarely up to 18 cm; 3) number of stems and extent of their branching, resulting in marked differences of aspect but geographically not differentiated. Disparity in sepal size also varies from one plant to another. The most consistent character is the number of stamens.

Section 2. **PARONYCHIELLA** Williams in Bull. Herb. Boiss. IV (1896) 558. — Style rather long; calyx lobes and stamens 4.

5. **H. polygama** J. Gay in Duch. Rev. Bot. II (1846–47) 371; Kryl., Fl. Zap. Sib. V, 1044. — *H. odorata* Andr. in Exsic. (1839) nomen nudum; Andrzh., Ischisl. rast. Podol'sk. gub. (1860) 43; Trautv. in Bull. Soc. Nat. Mosc. XXXVII (1864) 563; Shmal'g., Fl. II, 354. — Exs.: Fl. Polon. exs. no. 825.

Perennial; stems numerous, 3–20 cm long, prostrate or ascending, covered with short retrorse hairs; leaves 5–15 mm long, 1–3 mm broad, oblong-elliptic, cuneately tapering toward base, glabrous or slightly pubescent, ciliate-margined; stipules broad-ovate, ciliate; flowers perfect and unisexual, sessile, in axillary clusters or in spiciform inflorescences; calyx covered with uncinata hairs; sepals 4, elongate-oblong; stamens 4; style rather long, exceeding calyx; utricle about equaling calyx. (Plate XXXIV, Figure 4).

Fallows, sandy steppe slopes, and dry pinewoods. — European part: U. Dnp., M. Dnp., V.-Don, Transv., Bl., L. Don, L. V.; W. Siberia: U. Tob., SW part of Irt., Alt.; Centr. Asia: Ar.-Casp. **Gen. distr.:** Centr. Eur. (Poland). Described from the Ukraine.

Economic importance. Used, like *H. glabra* L., for medicinal purposes.

Note. Coumarin-scented in dry state.

Tribe 5. **PTERANTHEAE** Endl. Gen. (1840) 959; Benth. et Hook. Gen. III, 13. — Flowers axillary; calyx at first herbaceous, becoming indurated after flowering, with 4 or 5 stiff subulate lobes; ovary 1-loculed; styles 2.

Genus 484. **PTERANTHUS*** FORSK.

Forsk. Fl. Aeg.-Arab. (1775) 36. — *Louichea* L'Herit. Stirp. nov. (1785) 135.

Flowers in 3's, borne on a turbinate dilated somewhat flattened common peduncle, the middle sessile flower fertile, the lateral ones borne on very short pedicels, abortive, closely enveloped by 2 stiff subulate 5-parted

* From Greek pteros, wing, and anthos, flower.

appendages or completely transformed into appendages of similar constitution; calyx 4-lobed, finally closed, laterally fused; corolla none; stamens 4; ovary 1-loculed, containing 1 ovule; fruit saccate, membranous, 1-seeded. Annual with opposite or spuriously verticillate leaves. Russian name: krylotsvetnik [from krylo, wing, and tsvet, flower].

1. *P. dichotomus* Forsk. Fl. Aeg.-Arab. (1775) 36. — *Camphorosma pteranthus* Sibth. Fl. Graec. (1813) tab. 153; Asch. et Gr. Synops. V, 1 (1915) 448. — *Louichea pteranthus* L'Herit. Stirp. nov. I (1785) 135. — *L. cervina* L'Herit., l. c. (1785). — *Pteranthus echinatus* Desf. Fl. Atl. I (1789) 144; Fenzl in Ldb. Fl. Ross. II, 16; Boiss. Fl. Or. I, 752. — Ic.: l'Herit., l. c., tab. 65; Sibth. Fl. Graec., tab. 153.

573 Annual; stem twice or thrice forked, ascending or prostrate, 5–10 cm long, villous-pubescent or glabrate; leaves linear, 1–1.5 cm long and 0.5–1 mm broad, subacute, fleshy, glabrous, with minute scarious lanceolate stipules; flowers in a corymbose-paniculate inflorescence; bracts scarious, ciliate.

Argillaceous semideserts. — Caucasus: E. Transc. (Nargen Island); Tal. (Kura River mouth — Salyany). **Gen. distr.:** Med., Bal.-As. Min., Egypt, Arabia, Iran. Described from Egypt.

Note. This plant was recorded for the Flora of the Caucasus by Fenzl and Boissier, but was omitted by Lipskii and other authors of the Flora of the Caucasus. The Herbarium of the Botanical Institute of the Academy of Sciences contains specimens that confirm the occurrence of *P. dichotomus* Forsk. in eastern Transcaucasia, on Nargen Island and near the Kura estuary. The Caucasian location is far removed from the more southerly distribution area of the species, the locations nearest the Caucasus being southern Iran and Palestine. It is possible that the plant has not been collected at intervening points on account of its small size and the inadequate exploration of Iran and of the northern part of Asia Minor.

Subfamily 3. **SILENOIDEAE** A. BR. in Aschers. Fl. Prov. Brandenb. (1864) 60; Pax in Engl. u. Prantl, Naturl. Pflanzenf. 1 Aufl. III, 1 B. (1869) 69. — *Sileneaceae* Lindl. Nat. Syst. ed. 2 (1837) 124. — Leaves exstipulate; calyx gamosepalous, tubular or campanulate; corolla nearly always present; fruit, stamens and ovary very often borne on an androgynophore; style free.

Key to Tribes

1. Styles 3 or 5; calyx with commisural nerves. Tribe 1. **Lychnideae** A. Br.
- + Styles 2; calyx without commisural nerves . . . Tribe 2. **Diantheae** Pax.

Tribe 1. **LYCHNIDEAE** A. BR. in Flora XXVI (1843) 336. — Styles 3 or 5; fruit a many-seeded capsule dehiscing by teeth or valves, or indehiscent and berrylike; calyx with commisural nerves; aestivation of corolla alternately convolute.

Key to Genera

1. Styles 3 2.
- + Styles 5 5.
2. Fruit indehiscent, baccate; calyx cleft nearly to the middle into 5 lobes, wide open, patelliform 492. *Cucubalus* L.
- + Fruit a capsule opening apically by usually erect calyx teeth 3.
3. Capsule 3-loculed at base 487. *Silene* L.
- + Capsule 1-loculed 4.
4. Seeds shining, very slightly inflated, with a ridge around the hilum 491. *Petrocoma* Rupr.
- + Seeds dull, without a ridge around the hilum, not inflated 490. *Melandrium* Roehl.
5. Calyx cleft to below the middle into linear lobes, these exceeding the pink corolla; coronal scales wanting; seeds 3–5 mm in diameter 485. *Agrostemma* L.
- + Calyx shallowly 5-lobed; coronal scales mostly present at the base of petal limbs; seeds smaller 6.
6. Capsule dehiscing by 10 teeth, borne on a short carpophore; calyx inflated; flowers often unisexual and then plants dioecious 490. *Melandrium* Roehl.
- + Capsule sessile, dehiscing by 3 or 5 teeth, some of the teeth sometimes cleft; calyx tubular, not inflated; flowers perfect 7.
7. Capsule 5-locular in lower half; petals entire or very slightly notched 486. *Viscaria* Roehl.
- + Capsule 1-locular; petals 2- or 4-cleft, rarely entire 8.
8. Coronal scales inserted on a flat limb base 489. *Coronaria* L.
- + Coronal scales inserted on a convex limb base 488. *Lychnis* L.

Genus 485. **AGROSTEMMA** * L.**

L. Gen. I (1737) 135.

Calyx cleft to below the middle into 5 lobes, prominently 10-nerved; corolla dark rose, without coronal scales, shorter than calyx; petals entire, gently notched, gradually tapering to a claw; stamens 10; styles 5; capsule ovoid, 1-loculed, dehiscing by 5 short teeth. Hairy annuals. Russian name: kukol'.

1. Calyx tube oblong-ovoid at anthesis; seeds 3–3.5 mm long and 2–2.5 mm broad, muricate 1. *A. githago* L.
- + Calyx tube oblong or subcylindric at anthesis; seeds 2.5–2.8 mm long and half the weight of those of *A. githago*, covered with blunt flattened tubercles 2. *A. linicola* Terech.

1. *A. githago* L. Sp. pl. (1753) 435; Shmal'g., Fl. I, 145; Shishk. in Fl. Yugo-Vost. IV, 277; Kryl., Fl. Zap. Sib. V, 1046. — *Lychnis githago* Scop. Fl. carn. ed. 2, II (1772) 310. — *L. segetum* Lam. Fl. Franc. III (1778) 50. — *Githago segetum* Desf. Catal. pl. ed. III (1869) 266; Ldb. Fl. Ross. I, 322. — Ic.: Sorn. rast. SSSR, II, Fig. 151, 152. (common).

* From Greek *agros*, field, and *stemma*, wreath, the plant being useful for inclusion in wreaths of field flowers.

** Treatment by O.A. Murav'eva.

Annual, 30–80 cm high, covered with long soft hairs; stem erect, simple or branched; leaves linear to linear-lanceolate, 3–13 cm long, 2–10 mm broad; flowers large, solitary at tips of stem and branches; calyx tube oblong-ovoid, 1.5–2 cm long, the linear foliaceous lobes 2–3 cm long and ca. 2 mm broad, in branched forms about twice as long as limb of corolla (var. *ramosa* Lindb.), in forms with simple stem about equaling or scarcely exceeding the corolla limb (var. *simplex* Lindb.); styles filiform, hairy all round, as long as stamens; seeds almost black, 2.5–3.5 mm long, muricate. June–September.

A weed of field crops; in northern and middle latitudes infesting spring crops, especially oats; in the south occurring also among winter cereals. – European part: all regions; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh., Syr D., Pam.-Al. Gen. distr.: Scand., Centr. Eur., Iran. Described from Europe. Type in London.

Economic importance. A noxious weed of grain crops. An admixture of corn-cockle seeds in flour amounting to 0.5% is sufficient to produce harmful effect (according to Mal'tsev) as the seeds contain 6.56% of the toxic glucoside gitagin or agrostemmin ($C_{27}H_{28}O_{11}$).

2. *A. linicola* Rerech. in Trudy po Prikl. Bot. XXV, 4 (1930–1931) 281. – Ic.: Terekhov, l. c., p. 282 (seed illustration).

Outwardly resembling the preceding species but distinguishable by the less hairy calyx and the oblong or subcylindric calyx tube at anthesis; seeds smaller (2.5–2.8 mm long), their weight half that of *A. githago* L. seeds; seeds' surface covered with blunt and sometimes completely flattened tubercles. May–July.

A weed of low flax. – European part: Transv., V.-Don, L. V., L. Don. Endemic. Described from material supplied by the Kuibyshev District Seed Certification Station. Type in Kuibyshev.

Note. The information concerning this species is derived from A. F. Terekhov's publication "L'nyanoi kukol' [flax corn-cockle] (*Agrostemma linicola* Terech.)", l. c. The author refers the plant described by him to "specialized" weeds of flax. Unfortunately, no specimens have been found in the Herbarium of the Botanical Institute of the Academy of Sciences that could be included in this species. More observation and checking are required.

576 Genus 486. **VISCARIA** * ROEHL.**

Roehl. Deutschl. Fl. ed. 2, II (1812) 37.

Flowers rather large, in a verticillate-paniculate inflorescence; calyx oblong-obovoid, 10-nerved; petals 5, the entire or slightly notched limb with 2 rather large coronal scales; stamens 10; styles 5; capsule ovoid, 5-located at base. Perennial herbs; stems erect, simple; leaves linear-lanceolate, acute. Russian name: smolka.

1. Upper stem internodes viscous; petals raspberry-colored, rarely white, with entire limb (sometimes notched) 1. *V. viscosa* (Scop.) Aschers.

* From Latin *viscum*, bird lime, referring to the viscous stem of *V. viscosa* (Scop.) Aschers.

** Treatment by S.G. Gorshkova.

+ Upper stem internodes not viscous; petals white, with
2-cleft limb 2. *V. alpina* (L.) Don.

Section 1. **EUVISCARIA** Nyman, Consp. (1878) 86. — Calyx with distinct commissural nerves.

1. *V. viscosa* (Scop.) Aschers. Fl. Prov. Brandenb. (1864) 22; Grossg., Fl. Kavk. II, 403. — *Lychnis viscosa* Scop. Fl. carn. ed. 2, 1 (1772) 306. — *L. Viscaria* L. Sp. pl. (1753) 436; Shmal'g., Fl. I, 144. — *Viscaria vulgaris* Roehl. Deutschl. Fl. ed. 2, II (1812) 275; Ldb. Fl. Ross. I, 328. — *V. viscaria* Voss. in Vilmor. Blumengärtn. (1896) 100. — Ic.: Rchb. Ic. Fl. Germ. VI (1844) tab. 307, f. 5131; Hegi Ill. Fl. Mitt. Eur. III (1909) 276, f. 505 et tab. 98, f. 4 (*V. vulgaris* Roehl.). — Exs.: HFR no. 1558 (*V. vulgaris* Roehl.); Pl. Finl. Exs. no. 61.

Perennial, glabrous; stem simple, more rarely slightly branched, to 40–100 cm long, with very viscous upper internodes and with a leaf rosette at base; radical leaves linear-lanceolate, mostly petiolate; cauline leaves sessile, short-sheathing, linear, densely ciliate at base, 2–7 cm long and 2.5–5 mm broad; flowers in whorls of 5–7, forming a racemiform panicle; calyx tubular or oblong-obovoid, 10–12 mm long and 4–5 mm broad, slightly inflated, 10-nerved, with triangular obtuse teeth; petals raspberry-colored, rarely white (var. *albiflora* (Sweet.) Rouy et Fouc.), the broad obovate entire or sometimes notched limb with 2 rather large coronal scales at base; seeds strongly compressed, reniform, minutely tuberculate. May–July. (Plate XLV, Figure 1).

77 Dry meadows, hill slopes, and dry wood margins. — European part: Kar.-Lap., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc.; W. Siberia: Ob, U. Tob. **Gen. distr.:** Scand., Centr. Eur. Described from Europe. Type in London.

Economic importance. Sometimes occurring as a weed in stands of clover.

Section 2. **LIPONEURUM** Nyman, Consp. I (1878) 86. — Calyx with longitudinal nerves only.

2. *V. alpina* (L.) G. Don, Gen. Syst. I (1834–38) 415. — *Lychnis alpina* L. Sp. pl. (1753) 436. — Ic.: Rchb. Ic. Fl. Germ. VI (1844) tab. 307, f. 5130; Hegi Fl. Mitt. Eur. III (1909) tab. 98. i. 5. — Exs.: Mus. bot. Univer. Helsingf. distrib. no. 612; Fl. exs. Austro-Hung. no. 520 (*L. alpina* L.); F. Schultz herb. norm. nov. ser. no. 2419.

Perennial, glabrous; stem simple, unbranched, 3–33 cm long, with a dense leaf rosette at base, the upper internodes not viscid; leaves acute, ciliate in lower part, the radical narrowly oblong, and petiolate, the upper linear, sessile, 20–23 mm long and 2.5–3 mm broad; flowers in a paniculate inflorescence; calyx campanulate, 3–5 mm long and 2–3 mm broad, violet, 10-nerved, with oval obtuse teeth; petals white, with a 2-cleft limb and 2 coronal scales; seeds small, reniform, dark brown, finely tuberculate. May–July. (Plate XLV, Figure 2).

Dry meadows, sandy shores, and rocks. — European part: Kar.-Lap.
Gen. distr.: Scand., Centr. Eur., W. Med. Described from Europe. Type in London.

Genus 487. **SILENE** * L.

L. Gen. pl. ed. I (1737) 132.

Flowers perfect or more rarely unisexual and then plants monoecious or dioecious; calyx gamosepalous, with 10–30 anastomosing nerves; petals 5, white, pink, purple, or yellowish-green, the limb bifid or rarely multifid or entire, sometimes notched, often with 2 small scarious ovate or lanceolate coronal scales at base, the linear-cuneate smooth or ciliate claw often auriculately enlarged at summit; stamens and ovary (later capsule) mostly borne on a fairly long stipe (androgynophore), usually referred to as carpophore; stamens 10, biseriate, the outer series being the first to develop, the filaments naked or ciliate; ovary 3-loculed at base; styles 3; fruit a capsule, 3-celled at base, dehiscing by 6 teeth; seeds reniform, often bluntly or sharply tuberculate, very rarely with a winglike outgrowth. Perennial, biennial, or annual herbs with opposite leaves.

Economic importance. On the whole, the genus is of no economic importance, but certain species are noteworthy weeds of cereal and vegetable crops. A few species are ornamentals.

- | | | |
|----|--|-------------------------------------|
| 1. | Calyx 20–30-nerved, more or less inflated | 2. |
| + | Calyx 10-nerved, tubular or cylindric, rarely somewhat inflated | 11. |
| 2. | Calyx with 20 anastomosing nerves, the teeth obtuse; petals white, perennials | 3. |
| + | Calyx 30- or more rarely 20-nerved, attenuate toward summit, the base more or less inflated in fruit, the nerves not anastomosing, the teeth long-acuminate; petals commonly roseate or rosy-purple; annuals | 9. |
| 3. | Calyx pubescent | 4. |
| + | Calyx glabrous | 6. |
| 4. | Petals undivided, notched at apex | 5. <i>S. procumbens</i> Murr. |
| + | Petals fringed-multifid | 5. |
| 5. | Plants 50–100 cm high; leaves 8–10 cm long and 5–6 cm broad; coronal scales wanting; capsule subglobose, 6 cm long, 5 cm broad, borne on a short carpophore | 6. <i>S. multifida</i> (Ad.) Rohrb. |
| + | Plants 15–30 cm high; coronal scales lanceolate, acute, ca. 3 mm long; leaves 2–3 cm long and 0.5–1.5 cm broad; capsule oblong, 10 cm long, 7 cm broad, sessile | 7. <i>S. lacera</i> (Stev.) Sims. |
| 6. | Stem 7–15 cm long; bracts herbaceous; coronal scales present; carpophore half as long as capsule | 3. <i>S. uniflora</i> Roth. |
| + | Stem 25–100 cm long; bracts scarious; coronal scales wanting; carpophore one-fifth to one-fourth as long as capsule | 7. |

* The meaning and derivation of the name are unknown. It was first used by Lobelius in 1576. According to one version, the name is derived from the Greek *selenē*, moon, and refers to a plant used by shepherds for foot injuries and as a prophylaxis against snake bites.

7. Calyx 8–12 mm long, often obsoletely anastomosing; carpophore 1 mm long, covered with short hairs 4. *C. cserei* Baumg.
- + Calyx 13–18 mm long, distinctly anastomosing; carpophore 2–5 mm long, glabrous 8.
8. Calyx subglobose; leaves lanceolate, 6 cm long, 1–1.2 cm broad, narrowing toward base 1. *S. latifolia* (Mill.) Rendle et Britt.
- + Calyx somewhat elongated; leaves ovate to ovate-lanceolate, 6–10 cm long, 3–4.5 cm broad, rounded or sometimes cordate at base 2. *S. commutata* Guss.
9. Calyx 20-nerved (S. part of Centr. Asia) . . . 153. *S. coniflora* N. Esenb.
- + Calyx 30-nerved 10.
10. Plants 6–25 cm high, covered with usually simple hairs; calyx 10–15 mm long, its base somewhat inflated in fruit; capsule sessile, ca. 9 mm long 151. *S. conica* L.
- + Plants 20–60 cm high, covered with glandular hairs; calyx 20–35 mm long, its base markedly inflated in fruit; capsule borne on a short carpophore, ca. 18 mm long 152. *S. conoidea* L.
11. Inflorescence long; racemiform, simple or forked, the lower flowers on very short pedicels, the upper sessile; calyx nearly always pubescent, 7–15 mm long; biennials or annuals, mostly pubescent . . . 12.
- + Pedicels rather long or, if short, inflorescence different or flower solitary 19.
12. Bracts herbaceous; flowers in simple 1-sided racemes, distinctly pedicellate 13.
- + Upper bracts membranous; inflorescence dichotomously branched; flowers subsessile or borne on very short pedicels 15.
13. Indumentum consisting of short glandular as well as long simple hairs; fruiting calyx attenuate at summit, the nerves not anastomosing; petals longer than calyx, notched or crenate at apex; filaments hairy at base 24. *S. anglica* L.
- + Glandular indumentum and long simple hairs wanting; fruiting calyx not attenuate; petals considerably shorter than calyx; filaments glabrous 14.
14. Capsule oblong, 9 mm long; carpophore pubescent; seeds wingless 25. *S. brachypetala* Rob. et Cast.
- + Capsule subglobose, 5 mm long; carpophore glabrous; seeds with undulate wings 27. *S. apetala* L.
15. Flowers red; leaves not more than 8 mm broad; seeds 1 mm long 23. *S. euxina* Rupr.
- + Flowers always white; leaves broader; seeds 1.5 mm long 16.
- 580 16. Calyx glabrous or sparsely hairy on the nerves, often not more than 7 mm long and then doliform (Caucasus) . . . 20. *S. iberica* M. B.
- + Calyx not less than 10 mm long, always more or less hairy, never doliform 17.
17. Calyx 12–15 mm long, covered (especially on the nerves) with short stiff hairs 19. *S. dichotoma* Ehrh.
- + Calyx 10–12 mm long, covered on the nerves with rather long soft hairs 18.

18. Calyx rather densely covered on the nerves with hairs to 4 mm long; leaves heavily pubescent; plants 20–40 cm high (Talysh). 21. *S. talyshensis* Schischk.
+ Calyx covered with shorter crisp hairs; leaves crisp-hairy beneath, glabrate above; plants 30–40 cm high (S. Transc.) 22. *S. Thirkeana* C. Koch.
19. Arctic or alpine perennials 3–15 cm high; calyx 4–6 mm long, nearly always glabrous; carpophore 1–2 mm long; petals entire or notched, mostly pink 20.
+ Plants taller or, if dwarf, calyx longer or hairy or else petals deeply 2-fid 23.
20. Plants forming dense, flat often pulvinate mats with much branched and subimbricately leafy stems; flowering stems 3–4 cm long; flowers solitary 49. *S. acaulis* L.
+ Flowering stems 7–20 cm long; flowers 2–10 in a loose corymbiform inflorescence 21.
21. Leaves ovate-lanceolate, 2–4 mm broad; pedicels 6–20 mm long; petals with lanceolate coronal scales; stems usually branched from base 52. *S. rupestris* L.
+ Leaves linear, 0.5–2 mm broad; pedicels 1–8 mm long; petals without coronal scales; stems simple 22.
22. Plant covered throughout with slender hairs, more rarely glabrous and then leaf margins ciliate and always revolute; stems slender, 3–15-flowered. Mountains of Transcaucasia 50. *S. dianthoides* Pers.
+ Plant commonly glabrous throughout, more rarely hairy; stems stoutish, 1–3-flowered; leaves flat 51. *S. markoviczii* Schischk.
23. Flowers usually perfect; calyx 6–40 mm long; petals 2-lobed or notched, rarely entire; capsule borne on a rather long carpophore 24.
+ Flowers usually unisexual (the plants dioecious) in clusters or rarely in heads; calyx not more than 6 mm long; petals white, entire; bracts none; capsule sessile 155.
- 581 24. Calyx glabrous or very slightly roughened 25.
+ Calyx rather profusely covered with simple or glandular hairs 90.
25. Annual and biennial plants 26.
+ Perennials with a stout taproot 30.
26. Flowers numerous, in a compact head or a corymbiform-paniculate inflorescence; pedicels shorter than calyx; bracts scarious; petals notched, red, with lanceolate acute coronal scales 3–4 mm long 27.
+ Flowers not crowded; pedicels twice or thrice as long as calyx; bracts herbaceous, resembling foliar leaves but smaller; petals white or faintly pinkish 28.
27. Inflorescence subcapitate; calyx to 18 mm long; limb of petals entire; carpophore 9–10 mm long 28. *S. compacta* Fisch.
+ Inflorescence corymbiform-paniculate; calyx to 16 mm long; limb of petals notched; carpophore 5–6 mm long . . . 29. *S. armeria* L.

28. Stems scabrous-pubescent in lower part; calyx 12–15 mm long, the subulate teeth 5–6 mm long; petals pink, the limb cleft to the middle; carpophore pubescent 139. *S. chaetodonta* Boiss.
 + Stems glabrous; calyx 10–11 mm long, with short teeth; petals white, very rarely pinkish, the limb entire or lobed to one-third; carpophore glabrous 29.
29. Calyx ovoid, ca. 5 mm broad, with triangular obtusish teeth; petals entire, very slightly longer than calyx; seeds ca. 2 mm in diameter, wing-margined (Centr. Asia) 141. *S. nana* Kar. et Kir.
 + Calyx cylindric, ca. 2 mm broad, with subulate acute teeth, petals one and a half times as long as calyx, lobed to one-third; seeds 0.5–0.75 mm long, wingless (S. Transc.) 140. *S. arenosa* C. Koch.
30. Petals entire or very slightly notched 31.
 + Petals rather deeply 2-cleft or (very rarely) multifid, very rarely deeply notched 41.
31. Leaves ovate or broad-ovate, (10)15–30 mm broad 32.
 + Leaves linear or lanceolate, 1–5 (rarely up to 10) mm broad 35.
32. Leaves with prickly-toothed margin, sessile; calyx 11–12 mm long, with acute teeth; carpophore 2–3 mm long, glabrous 136. *S. schugnanica* B. Fedtsch.
 + Leaves with naked or scaberulous margin, ciliate, but without stiff bristles 33.
- 582 33. Cauline leaves with narrow-leaved axillary fascicles; stems and lower leaves minutely scaberulous (Pam.-Al.) 128. *S. scabrifolia* Kom.
 + Cauline leaves usually without axillary fascicles 34.
34. Calyx 8–10 mm long; pedicels 2–6 mm long; leaves obovate, the blade 3–4 cm long and 1–1.2 cm broad; stems 50–65 cm long (W. T. Sh.) 137. *S. obovata* Schischk.
 + Calyx 6–8 mm long; pedicels 6–10 mm long; leaves ovate-lanceolate, the blade 5–7 cm long and 1.5–3 cm broad; stems 80–100 cm long ★135. *C. kungessana* B. Fedtsch.
35. Cauline leaves with densely leafy axillary fascicles 36.
 + Cauline leaves without axillary fascicles 39.
36. Leaves linear-lanceolate to linear, 1–2 cm long and 0.5–3 mm broad; petals pink 129. *S. holopetala* Bge.
 + Leaves lanceolate to narrowly lanceolate, 3–8 cm long and 3–10 mm broad; petals commonly whitish 37.
37. Calyx 10–15 mm long, densely covered with short hairs; carpophore two-thirds as long as to slightly shorter than capsule 128. *S. gebleriana* Schrenk.
 + Calyx 5–10 mm long, glabrous; carpophore one-fourth to one-third as long as capsule 38.
38. Plant profusely branched, bushy; stems puberulent nearly to the summit; all leaves lanceolate or narrowly lanceolate 127. *S. sibirica* (L.) Pers.
 + Plant sparingly branched, not bushy, scabrous only in lower part; radical leaves spatulate 131. *S. komarovii* Schischk.
39. Flowers 5–20; calyx 5–7 mm long; capsule as long as calyx; radical leaves 5–10 mm broad 132. *S. pseudotenuis* Schischk.

- + Flowers 1–5; calyx 8–9 mm long; capsule 8–10 mm long; radical leaves 2–5 mm broad 40.
 40. Calyx slightly inflated, 3–5 mm broad; carpophore puberulent, one-third as long as capsule 133. *S. trajectorum* Kom.
 + Calyx not inflated, 2–3 mm broad; carpophore glabrous, half as long as capsule 134. *S. bobrovii* Schischk.
 41(30). Limb of petals deeply 4-parted into equal lobes 42.
 583 + Limb of petals 2-parted or 2-cleft, the lobes sometimes with small lateral teeth 43.
 42. Stems 40–60 cm long; leaves lance-linear, 2–5(9) mm broad; bracts with naked margins, 12–15 mm long 68. *S. odoratissima* Bge.
 + Stems 30–40 cm long, more densely leafy than in the preceding species; leaves broadly lanceolate, (6)9–15 mm broad; bracts with ciliate margins 69. *S. olgiana* B. Fedtsch.
 43. Calyx one and a half times to thrice as long as broad, ovaloid or campanulate, usually somewhat inflated, 6–14 mm long and 3–8 mm broad; coronal scales mostly wanting or very small; carpophore 1–3(4) mm long; inflorescence racemose or very rarely flowers solitary (Siberia and Centr. Asia) 44.
 + Calyx cylindric or cylindric-claviform, four to many times as long as broad, never inflated; coronal scales usually present, rarely wanting; carpophore often longer; inflorescence variously formed, often paniculate 51.
 44. Limb of petals parted nearly to base; coronal scales nearly always wanting; plants mostly glaucous 45.
 + Limb of petals cleft to about the middle or somewhat lower down, coronal scales often present; plants mostly green, rarely slightly glaucescent 47.
 45. Radical leaves linear to linear-lanceolate, 1–3 mm broad (Lake Balkhash area) 33. *S. balchaschensis* Schischk.
 + Radical leaves 5–15 mm broad 46.
 46. Stems 15–35 cm long; leaves 5–7 mm broad (T. Sh.)
 32. *S. gawrilowii* Krasch.
 + Stems 30–60 cm long; leaves 1–1.5 cm broad (Syr D.)
 34. *S. glaucescens* Schischk.
 47. Calyx teeth acutish or acute 48. *S. jennisseensis* Willd.
 + Calyx teeth rounded-ovate, obtuse 48.
 48. Stems usually monanthous; petals pink; leaves linear, 1–2 mm broad 47. *S. stenophylla* Ldb.
 + Stems bearing 3–7 or numerous flowers; petals whitish or lurid; leaves 2–4 mm broad 49.
 49. Petal claws ciliate 44. *S. graminifolia* Othth.
 + Petal claws naked 50.
 50. Stems 5–15 cm long; flowers erect, only the lower ones somewhat divergent; petal lobes enlarged at apex, obovate (Arctic)
 46. *S. paucifolia* Ldb.
 + Stems 20–40 cm long; flowers spreading or nodding; petal lobes oblong 45. *S. chamarensis* Turcz.

- 584 51. Profusely branched undershrubs, 8–30 cm high; leaves 5–13 mm long, with axillary fascicles; calyx coriaceous, often scabrous on the nerves or throughout 52.
- + Plants herbaceous or more rarely woody at base and then stems longer or axillary fascicles absent 53.
52. Calyx 17–20 mm long; leaves linear, 1–2 mm broad 80. *S. cretacea* Fisch.
- + Calyx 10–15 mm long; leaves spatulate, 2–4 mm broad 81. *S. suffrutescens* M. B.
53. Calyx 13–35 mm long 54.
- + Calyx 6–12 mm long 73.
54. Filaments nearly always glabrous, very rarely ciliate 55.
- + Petal claws and filaments ciliate 67.
55. Lower and middle cauline leaves suborbicular, short-pedicel, abruptly point-tipped, the margin sometimes very slightly crenulate; calyx 30–35 mm long; tall glaucous plants 56.
- + Leaves lanceolate or linear, very rarely ovate-lanceolate or linear 57.
56. Upper leaves oval-spatulate, abruptly point-tipped; coronal scales reduced to 2 bosses 67. *S. svertiifolia* Boiss.
- + All leaves alike; coronal scales developed, 2–3 mm long 66. *S. chlorifolia* Smith.
57. Leaves lanceolate, 4–8 mm broad 58.
- + Leaves linear, 1–4 mm broad 61.
58. Coronal scales wanting (Turkmenia) 59.
- + Coronal scales present 60.
59. Calyx 22–26 mm long, the teeth alternately obtuse and acute; petal limb lobed to one-third; axillary fascicles wanting 60. *S. litwinowii* Schischk.
- + Calyx 15–16 mm long, all teeth obtuse; petal limb lobed nearly to the middle; axillary fascicles present 71. *S. plurifolia* Schischk.
60. Calyx 23–30 mm long, the teeth acute (European part) 58. *S. longiflora* Ehrh.
- + Calyx 17–20 mm long, the teeth alternately obtuse and acute 59. *S. bupleuroides* L.
61. Plants 8–10 cm high, quite glabrous; leaves 1–1.5 mm broad; calyx 23 mm long, the linear-lanceolate teeth terminating in a long slender point one-fourth length of the calyx; stems 1–3-flowered 64. *S. longidens* Schischk.
- 585 + Plants 20–80 cm high; calyx teeth never reaching one-fourth length of tube, obtuse or acute but not point-tipped 62.
62. Petals with a tooth on each side at the base of the limb 70. *S. anisoloba* Schrenk.
- + Petal limb 2-cleft, without basal teeth 63.
63. Leaves 2–4 mm broad; carpophore 10–13 mm long 64.
- + Leaves 1–2 mm broad; carpophore 5–9 mm long (Caucasus) 65.
64. Calyx 25–30 mm long, the teeth alternately obtuse and acute (Caucasus) 62. *S. solenantha* Trautv.

- + Calyx 15–25 mm long; all teeth obtuse (Centr. Asia) 61. *S. tachtensis* Franch.
65. Stems densely velvety-pubescent in lower part; coronal scales reduced to tubercles 65. *S. tenella* C. A. M.
- + Stems glabrous in lower part; coronal scales applanate 66.
66. Calyx teeth alternately obtuse and acute; stem commonly monanthous ★63. *S. armena* Boiss.
- + All calyx teeth obtuse; stem several – many-flowered, very rarely 1-flowered 106. *S. linearifolia* Otth.
67. Root collar densely woolly 76. *S. sarawschanica* Rgl. et Schmal.
- + Root collar naked 68.
68. Coronal scales wanting or reduced to bosses 69.
- + Coronal scales present 70.
69. Stems branched; inflorescence few-flowered; calyx 15–16 mm long; limb of petals divided to base into linear segments; leaves 5–8 mm broad 71. *S. plurifolia* Schischk.
- + Stems simple; inflorescence racemose; calyx 12–14 mm long; limb of petals cleft to the middle into oblong lobes; leaves 0.5–2 mm broad 77. *S. leptocaulis* Schischk.
70. Leaves 2–5 mm broad; calyx teeth often truncate, more rarely alternately obtuse and acute 75. *S. obtusidentata* B. Fedtsch. et M. Pop.
- + Leaves 6–35 mm broad; calyx teeth obtuse, not truncate or alternately obtuse and acute 71.
71. Calyx 12–20 mm long; limb of petals parted to three-quarters 72. *S. baldshuanica* B. Fedtsch.
- + Calyx 20–35 mm long; limb of petals lobed to one-third or to the middle 72.
72. Calyx 20–25 mm long; leaves 2–4 cm long, narrow-ovate, without axillary fascicles 74. *S. kudrjaschevii* Schischk.
- 586 + Calyx 25–35 mm long; leaves 6–12 cm long, lanceolate, with axillary fascicles 73. *S. bucharica* M. Pop.
73. Filaments hairy 74.
- + Filaments glabrous 79.
74. Pedicels minutely hairy or scabrous (indumentum more easily discernable on the middle flower of a dichasium); bracts ciliate 75.
- + Pedicels glabrous 76.
75. Plants 60–100 cm high, knotted; leaves lanceolate, 6–9 cm long and 0.5–1 cm broad, with axillary fascicles of narrower leaves 56. *S. propinqua* Schischk.
- + Plants 30–60 cm high; leaves linear, usually without axillary fascicles 55. *S. marschallii* C. A. Mey.
76. Coronal scales wanting or reduced to a pair of bosses 77.
- + Coronal scales lance-linear or subulate, 1–1.5 mm long 78.
77. Flowers in a paniculate inflorescence; petal limb divided to base 57. *S. gasimailikensis* B. Fedtsch.

- + Flowers in a contracted racemiform panicle, with branches more or less appressed to the rachis; petal limb parted to below the middle but not to base; coronal scales wanting or reduced to a pair of bosses; carpophore usually glabrous (S. Transc.) 54. *S. lasiantha* C. Koch.
78. Flowers in a loose sometimes 1-sided panicle, nodding; petals parted nearly to base; coronal scales lance-linear, 1.5 mm long; carpophore 2–5 mm long (Caucasus) 53. *S. ruprechtii* Schischk.
- + Petal limb cleft to the middle or to three-fourths; coronal scales subulate or lanceolate; carpophore 5–8 mm long (Centr. Asia) 72. *S. baldshuanica* B. Fedtsch.
79. Perennial, woody at base, 15–35 cm high, covered, especially in lower part, with rather long stiff recurved almost subulate hairs; leaves undulate, lance-spatulate, the margin and midrib covered with prickly bristles; coronal scales to 1 mm long (Daghestan) 38. *S. dagestanica* Rupr.
- + Plants glabrous or hairy (not subulate) 80.
80. Axillary fascicles with smaller leaves, often reduced to leaf clusters 81.
- + Axillary fascicles wanting 88.
- 587 81. Stem sharply scabrous almost to the summit; leaves linear-lanceolate, with sharply scabrous margins; petals yellowish-green, the limb lobed to one-third into oblong lobes (*S. Transcaucasia*) 40. *S. eremitica* Boiss.
- + Stems glabrous, or hairy or scabrous in lower half only; limb of petals divided to two-thirds or nearly to base, very rarely lobed to one-third or notched 82.
82. Coronal scales minute, applanate, ca. 0.5 mm long 83.
- + Coronal scales wanting or reduced to a pair of inconspicuous bosses 84.
83. Petal limb yellowish-green, 2-parted nearly to base; calyx 8–9 mm long; capsule 10 mm long (Caucasus) 39. *S. chloropetala* Rupr.
- + Petals white, the limb lobed to one-third; capsule 5–6 mm long (Far East) 41. *S. macrostyla* Maxim.
84. Calyx 6–9 mm long (Far East) 85.
- + Calyx 10–12 mm long (European part, W. Siberia, and Centr. Asia) 86.
85. Calyx 6–7 mm long; stems not viscid at summit; petal limb deeply 2-cleft 43. *S. foliosa* Maxim.
- + Calyx 7–9 mm long; stems viscid at summit; petal limb deeply notched 41. *S. koreana* Kom.
86. Stems often violet-tinged, with sparse crisp hairs in lower part; inflorescence secund; pedicels crisp-hairy below the calyx; petal limb tubercled at base 36. *S. tatarica* (L.) Pers.
- + Stems minutely scaberulous or scabrous in lower part; pedicels glabrous; coronal scales none 87.
87. Calyx 11–12 mm long; carpophore glabrous 35. *S. lithophila* Kar. et Kir.

- + Calyx 10 mm long; carpophore pubescent . . . 37. *S. praemixta* M. Pop.
88. Stem puberulent in lower part; radical leaves 10–20 mm broad 31. *S. multiflora* (Ehrh.) Pers.
- + Stem glabrous; leaves 1–9 mm broad 89.
89. Inflorescence a 1-sided racemiform panicle; radical leaves 4–9 mm broad 30. *S. chlorantha* (Willd.) Ehrh.
- + Flowers solitary or several; radical leaves 1–2 mm broad 35. *S. lithophila* Kar. et Kir.
90. (24). Petal limb entire. 128. *S. gebleriana* Schrenk.
- + Petal limb notched or cleft to the middle or below 91.
- 588 91. Limb of petals shallowly notched; stems procumbent; calyx inflated 5. *S. procumbens* Murr.
- + Limb of petals cleft to the middle or below, very rarely lobed to one-third or one-fourth its length and then plants differing in other characters 92.
92. Calyx teeth acuminate; calyx more or less inflated; petal limb 2-cleft, usually with one lateral tooth, low mountain plants of the Caucasus and Central Asia, with few-flowered stem and several pairs of leaves 93.
- + Calyx teeth obtuse or acute; limb of petals rather deeply cleft (very rarely to one-fourth), without lateral teeth; calyx cylindric, very rarely inflated 102.
93. Calyx not less than 18 mm long 94.
- + Calyx 12–15 mm long 98.
94. Carpophore, claws and outer surface of petals glandular-pubescent; calyx teeth narrowly lanceolate, terminating in a long slender point 13. *S. adenopetala* Rain.
- + Carpophore and petals glabrous 95.
95. Radical leaves linear, 1–4 mm broad, markedly differing from the ovate or lanceolate cauline leaves 96.
- + Radical leaves 4–20 mm long; cauline leaves resembling the radical 97.
96. Cauline leaves 0.5–1 cm long, obscurely veined. Centr. Asia 10. *S. samarkandensis* Preobr.
- + Cauline leaves longer, prominently 3–5-veined. Transcaucasia 18. *S. commelinifolia* Boiss.
97. Stems covered in lower part with simple, in upper part with glandular hairs; cauline leaves 2–4 pairs (Centr. Asia) 11. *S. conformifolia* Preobr.
- + Plant glandular-pubescent throughout; leaves 5–8 pairs (W. Transc.) 17. *S. lazica* Boiss.
98. Cauline leaves lance-linear, 1–3 mm broad 99.
- + Cauline leaves ovate or lanceolate, 4–15 mm broad 100.
99. Radical leaves 1–2 mm broad, acute, very often glabrous, with only the margin stiffly ciliate; stems usually 1-flowered 14. *S. raddeana* Trautv.
- + Radical leaves 4–5 mm broad, covered with short crisp hairs; stems usually 2- or 3-flowered 15. *S. physocalyx* Ldb.
100. Cauline leaves 5–8 pairs, much longer than internodes 16. *S. artwinensis* Schischk.

- 589 + Cauline leaves 2-4 pairs, much shorter than internodes 101.
101. Plant 30-40 cm high; radical leaves 1.2-2.5 cm broad; calyx covered with simple hairs 12. *S. michelsoni* Preobr.
- + Plant 5-20 cm high; radical leaves lanceolate, 0.2-1.2 cm broad; calyx covered with glandular hairs 102.
102. Radical leaves and lower part of stem usually glabrous; cauline leaves lance-ovate, 0.4-0.8 mm broad; stem 3-8-flowered 9. *S. turcomanica* Schischk.
- + Plant densely glandular-pilose throughout; cauline leaves broad-ovate or ovate-oblong, 0.6-1.1 cm broad; stem 1-3-flowered 8. *S. oreina* Schischk.
- 103 (91). Flowers forming a loose, mostly 1-sided panicle or in nodding racemes; stems 50-80 cm long; calyx teeth mostly acute 104.
- + Flowers pointing in different directions, erect or ascending, or flowers solitary 106.
104. Plant covered throughout with patulous hairs; stem sharply angled, branched nearly to base; flowers pendulous, in a rather long 1-sided raceme; pedicels rather long; calyx 13-15 mm long, membranous, with very prominent thickish green leaves, somewhat inflated; petals 25 mm long, red 26. *S. pendula* L.
- + Petals white or greenish; calyx without thick nerves; stems terete 105.
105. Calyx 11-12 mm long, with ovate teeth; petals whitish, with coronal scales; panicle 1-sided, nodding 125. *S. nutans* L.
- + Calyx 15 mm long, with lanceolate teeth; petals greenish, without coronal scales (Crimea) 124. *S. viridifolia* L.
106. Calyx at least (23) 25 mm long 107.
- + Calyx usually not more than 10-20 mm, very rarely up to 23 mm long 114.
107. Plant forming a compact pulvinate mat 5-10 cm in diameter 108.
- + Plant densely matted, not pulvinate, or stems solitary 109.
108. Plant glandular-pubescent throughout; leaves 0.5-1 mm broad; bracts distant from calyx (Kugitang) 122. *S. nevskii* Schischk.
- + Stems glabrous in lower part, covered in upper part with simple as well as glandular hairs; leaves 1.5-3 mm broad; bracteoles inserted at base of calyx (T. Sh.) 121. *S. korshinskyi* Schischk.
109. Cauline leaves exceeding internodes; bracteoles 4, inserted at base of calyx; petals pink; capsule 5 mm long, four times as long as the glabrous carpophore (Talysh) 118. *S. meyeri* Fenzl.
- + Cauline leaves usually shorter than internodes; bracteoles 2, inserted below the calyx or lower down; petals whitish 110.
- 590 110. Carpophore glabrous 111.
- + Carpophore pubescent 112.
111. Leaves 4-7 mm broad; petal limb cleft to one-fourth or one-third (*S. Transcaucasia*) 120. *S. araratrica* Schischk.
- + Leaves 0.5-4.5 mm broad; petal limb cleft to one-half or three-fourths (Centr. Asia) 119. *S. guntensis* B. Fedtsch.
112. Axillary fascicles present (Centr. Asia and Altai) 113. *S. incurvifolia* Kar. et Kir.

- + Axillary fascicles wanting (Caucasus) 113.
113. Carpophore 10–13 mm long, densely pubescent in lower part, glabrous above; capsule exceeding carpophore; seeds striate, 1.5–2 mm long 110. *S. grossheimii* Schischk.
- + Carpophore 15–30 mm long, twice to three and a half times length of capsule, hairy up to summit; capsule 8 mm long; seeds minutely tuberculate, ca. 1 mm long; plants covered with simple as well as glandular hairs 109. *S. depressa* M. B.
- 114 (106). Undershrubs; leaves 5–13 mm long, narrow, with leaf clusters in the axils; calyx coriaceous, 10–20 mm long 115.
- + Plants herbaceous or woody at base and then leaves longer or calyx not coriaceous 116.
115. Calyx 17–20 mm long; leaves linear, 1–2 mm broad 80. *C. cretacea* Fisch.
- + Calyx 10–15 mm long; leaves spatulate, 2–4 mm broad 81. *S. suffrutescens* M. B.
116. Leaves linear or subulate, subtrigonus, subulate-tipped, stiff, somewhat spinescent; stems rather numerous, 30–50 cm long, usually more or less pubescent in lower part, glabrous above, viscid; calyx sparingly pubescent 117.
- + Leaves not stiff and not spinescent, mostly flattish 118.
117. Stems terete; leaves sharply scabrous on the margin, equidistant on stems and branches; calyx 12–15 mm long; petal limb parted into linear segments 78. *S. altaica* Pers.
- + Stems strongly compressed at base; leaves with almost naked margins, often crowded in lower part of the stem, usually longer; calyx 15–24 mm long; petal limb of petals with lobes dilated at apex and cuneately attenuate toward base 79. *S. alexandrae* Keller.
118. Stem and leaves glabrous; calyx 7–8.5 mm long, both calyx and pedicel densely covered with simple hairs (Gr. Caucasus) 91. *S. caespitosa* Stev.
- 591 + Stem and leaves more or less hairy or, if glabrous, calyx at least 10 mm long 119.
119. Filaments ciliate 120.
- + Filaments glabrous or (very rarely) villous 123.
120. Coronal scales wanting 121.
- + Coronal scales subulate, 0.75–4 mm long 122.
121. Calyx 12–13 mm long; capsule one and a half times to twice as long as carpophore; leaves linear, 1–3 mm broad (Mtn. Turkm., Pam. Al.) 83. *S. claviformis* Litw.
- + Calyx 16–23 mm long; capsule as long as carpophore; leaves lanceolate, 3–7 mm broad 82. *S. tomentella* Schischk.
122. Calyx with alternately obtuse and acute teeth; petal limb 2-fid to the middle; coronal scales 3–4 mm long; carpophore pubescent 85. *S. semenovii* Rgl.
- + Calyx with obtuse teeth; petal limb 2-fid to two-thirds; coronal scales lanceolate, 0.75 mm long; carpophore glabrous 82. *S. heptapotamica* Schischk.

123. Coronal scales wanting; plants 30–80 cm high, hairy in lower part, viscid above; leaves spatulate, 3–5 cm long; flowers in a lax panicle; calyx 18–21 mm long; petals white; capsule 9 mm long, as long as the hairy carpophore 126. *S. italica* (L.) Pers.
+ Coronal scales always present 124.
124. Leaves very prominently 3–6-veined, usually eglandular.
S. Transcaucasia 125.
+ Leaves obscurely veined or, if prominently veined, then glandular-pubescent 126.
125. Stems ascending, with short leafy shoots at base; leaves more or less spreading, often falcately recurved; calyx 11–13 mm long, prominently nerved and covered with thickish often glandular hairs 101. *S. pachyneura* Schischk.
+ Stems erect at base, without leafy shoots; leaves linear-lanceolate, ascending; calyx 15–17 mm long 102. *S. sisianica* Boiss. et Buhse.
126. Cauline leaves with narrow-leaved axillary fascicles; calyx 7–20 mm long 127.
+ Axillary fascicles usually wanting 132.
- 592 127. Herbaceous plants with lance-linear leaves 3–7 mm broad (Siberia and E. regions of the European part) . . . 89. *S. repens* Pat.
+ Plants woody at base, with linear leaves 1–3 mm broad (Caucasus and Centr. Asia) 128.
128. Calyx 14–20 mm long; leaves 2–5 mm broad 129.
+ Calyx 7–14 mm long; leaves 1–2 mm broad 130.
129. Plant 15–30 cm high, densely covered with short hairs; calyx 14–16 mm long; petal claw eciliate, very slightly enlarged at summit (*S. Transcaucasia*) 97. *S. pruinosa* Boiss.
+ Plants 20–50 cm high, woody at base, covered with short retrorse hairs; calyx 17–20 mm long; petal claw ciliate and in upper part abruptly auriculate (N. Caucasus, Crimea) 92. *S. supina* M. B.
130. Calyx 11–14 mm long; capsule ovoid, 7–9 mm long (Centr. Asia) 88. *S. brahuica* Boiss.
+ Calyx 7–12 mm long; capsule pyriform, ca. 5 mm long (Caucasus) 131.
131. Plant woody at base; stems numerous, 10–40 cm long, covered with short crisp hairs, glandular at summit; leaves spatulate-linear, 1–2 mm broad; flowers short-pedicceled, sometimes gathered at the ends of stems and branches into a subcapitate corymb; fruiting calyx tightly enclosing capsule or scarcely inflated 86. *S. spergulifolia* (Desf.) M. B.
+ Similar to the preceding, but calyx inflated 87. *S. brotherana* Som. et Lev.
132. Petals red; calyx 11–15 mm long; dwarf alpine plants with spatulate or broad-ovate or sometimes suborbicular leaves (Gr. Caucasus) 133.
+ Petals white or, if red, calyx larger and shape of leaves different 134.

133. Leaves 8–15 mm broad; flowers 3–7, erect; calyx 11–12 mm long, covered with short eglandulose hairs; capsule one and a half times as long as the hairy carpophore 103. *S. pygmaea* Ad.
 + Leaves 3–5 mm broad; flowers solitary at tips of stems and branches, nodding; calyx 12–15 mm long, glandular-pubescent; capsule four to five times as long as the tomentose carpophore 102. *S. humilis* C. A. M.
 134. Leaves spatulate, 1–2 cm long and 4–5 mm broad (S. Transc.) 97. *S. prilipkoana* Schischk.
 + Leaves lanceolate or linear, usually longer 135.
 593 135. Calyx 10–16(17) mm long, usually more or less inflated, more rarely cylindric 136.
 + Calyx (16) 17–22 mm long, cylindric or cylindric-claviform, not inflated 147.
 136. Plants 7–25 cm high, with 1–3 pairs of leaves; stem 1–4-flowered; calyx glandular-pubescent 137.
 + Cauline leaves usually more numerous; stems mostly many-flowered 139.
 137. Leaves linear, 1–2 mm broad, with naked margin, ciliate only at base; filaments villous (Altai) 108. *S. turgida* M. B.
 + Leaves lanceolate, 3–8 mm broad, glandular-pubescent; filaments glabrous (Caucasus) 138.
 138. Flowers long-pedicel, nodding; calyx broadly campanulate, 7 mm broad (Gr. Cauc.) 105. *S. lychnidea* C. A. M.
 + Flowers short-pedicel, erect; calyx narrowly cylindric-claviform, 3–4 mm broad (S. Transc.). 112. *S. tatjanae* Schischk.
 139. Stems and leaves glabrous; pedicels wooly-pubescent; calyx 15–16 mm long 106. *S. linearifolia* Otth.
 + Stems and leaves hairy 140.
 140. Flowers gathered in a loose terminal head (Transcaucasia) 90. *S. cephalantha* Boiss.
 + Flowers in a loose inflorescence or (rarely) solitary 141.
 141. Calyx glandular 142.
 + Calyx, like the plant as a whole, covered with simple hairs rarely interspersed with glandular ones 146.
 142. Calyx campanulate, distinctly inflated; bracteoles broadly scarious-margined, at some distance from calyx (Gr. Cauc.). 107. *S. kubanensis* Som. et Lev.
 + Calyx cylindric or slightly inflated, 2–5 mm broad; bracteoles herbaceous, inserted just below the flower (Transc. and Centr. Asia) 143.
 143. Leaves 0.5–2 mm broad, commonly velvety-puberulent; calyx somewhat inflated, 3–6 mm broad (Mtn. Turkm.) 100. *S. indepressa* Schischk.
 + Leaves 2–4 mm broad, often glandular-pubescent; calyx cylindric, not inflated, 2–2.5 mm broad (S. Transc.) 144.
 144. Calyx more or less inflated, 4–5 mm broad 96. *S. bornmülleri* Freyn.
 + Calyx cylindric, not inflated, 2–3 mm broad 145.
 594 145. Stems 15–30 cm long; calyx 15–17 mm long 95. *S. ispirensis* Boiss.

- + Stems 30–45 cm long; calyx 12–15 mm long (S. Transc. and Tal.) . . . 94. *S. aucheriana* Boiss.
146. Petals red or bright pink, the limb 2-parted into linear lobes, these in turn sometimes 2-fid 99. *S. popovii* Schischk.
- + Petals white or light pink, the limb 2-fid 98. *S. crispans* Litw.
147. Carpophore pubescent 148.
- + Carpophore glabrous 151.
148. Petals purple, the limb merely notched at apex; carpophore 15 mm long; seeds sharply tuberculate 114. *S. schafta* Gmel.
- + Petals white, the limb cleft to one-third or half its length; carpophore 8–10 mm long 149.
149. Radical leaves tapering to a rather long petiole; petal limb lobed to one-third, the claw glabrous 112. *S. tatjanae* Schischk.
- + Radical leaves narrowing toward base, sessile; petal limb cleft to the middle or lower, the claw usually ciliate 150.
150. Calyx 20–25 mm long; flowers nodding; bracts linear. Alt. (T. Sh.) 113. *S. incurvifolia* Kar. et Kir.
- + Calyx 18–20 mm long; bracts ovate-lanceolate 111. *S. caucasica* (Bge.) Boiss.
151. Stems 5–10 cm long, 1-flowered (rarely 2- or 3-flowered) 152.
- + Stems 10–30 cm long, 3–5-flowered 154.
152. Stems glandular-puberulent; leaves linear, 0.5–1.5 mm broad (Pamir) 117. *S. karaczukuri* B. Fedtsch.
- + Stems covered with simple retrorse or crisp hairs; leaves spatulate or lance-linear 153.
153. Leaves spatulate, glabrous, the margin ciliate (Gr. Cauc.) 123. *S. alpicola* Schischk.
- + Leaves lance-linear, very slightly grayish-pubescent (Centr. Asia) 116. *S. pamirensis* (H. Winkl.) Preobr.
154. Plant with densely leafy and heavily pubescent sterile shoots at base; leaves 1–4 mm broad 116. *S. pamirensis* (H. Winkl.) Preobr.
- + Plant without densely leafy sterile shoots at base; leaves 4–7 mm broad 115. *S. kuschakewiczi* Rgl. et Schmalh.
- 595 155 (23). Flowers sessile, in compact heads subtended by large ovate bracts 138. *S. capitellata* Boiss.
- + Flowers pedicellate, in loose axillary and terminal clusters. 156.
156. Calyx and pedicel puberulent 157.
- + Calyx and pedicel glabrous or (rarely) very slightly scabrid 158.
157. Flowers very small; calyx 2–2.5 mm long; capsule ovoid-globular, 2–3 mm long 149. *S. parviflora* (Ehrh.) Pers.
- + Flowers large; calyx at least 3.5 mm long; capsule ovoid, ca. 7 mm long 145. *S. hellmanni* Claus.
158. Plant 60–120 cm high, densely covered in lower part with long patulous hairs; panicle large; cauline leaves 10 cm long and 1.5 cm broad 145. *S. densiflora* Urv.
- + Plants 30–80 cm high, covered with short hairs; cauline leaves 2–6 cm long and 2–6 mm (rarely to 1 cm) broad 159.

159. Flowers very small; calyx 2–2.5 mm long; capsule globose, 2–3 mm long 150. *S. media* (Lit.) Kleop.
 + Flowers large; calyx at least 3 mm long; capsule ovoid, 4–9 mm long 160.
 160. Capsule 6–9 mm long; petals and lower part of stamens pubescent 148. *S. cyri* Schischk.
 + Capsule 4–6 mm long; petals and lower part of stamens glabrous 161.
 161. Plant 50–80 cm high; inflorescence mostly divaricate, with opposite branches, forming a pyramidal panicle 140. *S. wolgensis* (Willd.) Bess.
 + Plant 10–60 cm high; inflorescence racemose-paniculate or with long ascending branches 162.
 162. Inflorescence branched, with long ascending branches 144. *S. pseudo-otites* Bess.
 + Inflorescence often unbranched, with loose flower clusters 163.
 163. Stems densely covered in lower part with short hairs; petals one and a half times as long as calyx . . . 145. *S. baschkirorum* Janisch.
 + Stems glabrous or in lower part minutely scaberulous; petals twice to two and a half times as long as calyx; capsule borne on a carpophore 1–2 mm long 147. *S. polaris* Kleop.

Subgenus 1. **Behen** (Moench) Bge. in Ldb. Fl. Alt. II (1830) 128. — Rohrb. Monogr. Gatt. *Silene* (1867) 66 ex parte. — Gen. Behen Moench, Meth. (1794) 709. — Subgen. *Gastrosilene* Will. in Journ. Linn. Soc. XXXII (1896) 24. — Sect. *Behenantha* Otth. in DC. Prodr. I (1824) 367. — *Inflatae* Boiss. Fl. Or. I (1867) 573. — Flowers perfect; calyx inflated, not attenuate at summit, 10–20-nerved, reticulate; petals usually 2-fid or (rarely) notched, or else multifid; capsule borne on a short carpophore. Perennials.

596

Series 1. **Inflatae** Boiss. Fl. Or. I (1867) 573, ex parte. — Calyx 20-nerved, reticulate, glabrous; petals 2-lobed; capsule subglobose.

1. *S. latifolia* (Mill.) Rendle et Britt. List Brit. Seed-Plants (1907) 5; Shishk. in Fl. Yugo-Vost. IV, 286; Kryl., Fl. Zap. Sib. V, 1053. — *Cucubalus behen* L. Sp. pl. (1753) 414, non *Silene behen* L. — *C. latifolius* Mill. Gard. Dict. ed. 8 (1768) no. 2. — *C. venosus* Gilib. Fl. Lithuan. II (1781) 165. — *Behen vulgaris* Moench, Meth. (1794) 709. — *Cucubalus inflatus* Salisb. Prodr. (1796) 302. — *Silene cucubalis* Wibel. Prim. Fl. Werth. (1799) 241; Rohrb. Monogr. *Silene*, 84. — *S. inflata* Sm. Fl. brit. (1800) 467; Ldb. Fl. Ross. I, 304; Shmal'g., Fl. I, 136. — *S. inflata* var. *vulgaris* Turcz. Fl. baic.-dahur. I (1842) 202. — *S. venosa* Aschers. Fl. Prov. Brandenb. II (1864) 23. — *S. vulgaris* Garcke, Fl. Deutschl. 9 Aufl. (1869) 64. — Ic.: Hegi, Illustr. Fl. Mittel-Eur. III, t. 99, p. 280.

Perennial, glabrous throughout, glaucous; stem 40–100 cm long, erect, branched at summit; leaves lanceolate to ovate-lanceolate, 4–10 cm long and 1–3 cm broad, acute, sessile, the lower petiolate, the petiole with a prickly-toothed margin; flowers heterogeneous, in loose cymes at the ends of stem and branches; pedicels as long as or shorter than calyx;

calyx glabrous, inflated, broad-ovoid, 13–18 mm long, and 7–10 mm broad, 20-nerved, reticulately anastomosing; calyx teeth broadly triangular, acute, ciliate-margined; petals white, rarely pink, one and a half times to twice as long as calyx, the limb parted nearly to base into obovate segments; coronal scales wanting; claw enlarged at summit, glabrous; capsule subglobose, 8–9 mm in diameter; carpophore glabrous, 2 mm long; seeds reniform, 1.5 mm long and 1.2 mm broad, tuberculate. June–September. (Plate XXXV, Figure 4).

Meadows, open woods, coppices, fallows, cultivated fields, and vegetable gardens. — European part: All regions; Caucasus: Cisc., E. and S. Transc. (occasionally among crops); all Siberia and Far East; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb. **Gen. distr.:** Centr. and Atl. Eur., Med., Bal.-As. Min., Iran, Ind.-Him., N. and S. Am. (introduced). Described from Europe. Type in London.

Economic importance. The seeds infest cereal crops.

Note. In those regions of the USSR, such as the Crimea, Transcaucasia, and the southern part of Central Asia, which constitute the distribution area of a closely related species, *S. commutata* Guss., *S. latifolia* occurs only sporadically, apparently introduced together with seed material.

97

2. *S. commutata* Guss. Fl. Sic. Prodr. I (1827) 499; Boiss. Fl. Or. I, 629; Grossg., Fl. Kavk. II, 404. — *S. inflata* β *armena* C. Koch in Linnaea XV (1841) 712. — *S. inflata* var. 2 Ldb. Fl. Ross. I (1842) 305. — *S. inflata* β *athoa* Griseb. Fl. Rum., Bith. (1843) 171. — *S. cucubalus* β *commutata* Rohrb. Monogr. Silene (1868) 86; Som. et Lev. in A. H. P. XVI (1900) 74. — *S. venosa* β *commutata* Gürke in Richter-Cürke Pl. Europ. II (1899) 286. — *S. angustifolia* subsp. *vulgaris* var. *commutata* Briq. Prodr. Fl. Cors. I (1910) 546. — Exs.: H. F. A. M. no. 473.

Perennial; stem smooth, glaucous, 30–80 cm long; leaves obovate, oblong, or elliptic, with naked or ciliate margin, 2–4 cm long and 1.2–2 cm broad, attenuate or rounded at base, mucronulate from an obtuse apex; bracts small, scarious; calyx 13–18 mm long, elongating in fruit to 20 mm, with broadly triangular acutish teeth, glabrous; petals one and a half times to twice as long as calyx, white; limb parted nearly to base; coronal scales wanting; claw glabrous; carpophore 2–5 mm long, glabrous. May–September.

Open woods, grassy slopes, fields, and weedy places. — European part: Crim.; Caucasus: W., E., and S. Transc.; Centr. Asia: T. Sh., Dzu.-Tarb., Pam.-Al. **Gen. distr.:** W. and E. Med., As. Min., Arm.-Kurd., Iran. Described from Sicily (Busambra, Pizzuta, Favinianna).

3. *S. uniflora* Roth in Usteri Ann. Bot. X (1794) 46. — *S. maritima* With. Bot. arr. Brit. pl. ed. 3, II (1796) 414; Ldb. Fl. Ross. I, 305; Rohrb. Monogr. Silene, 84; *Cucubalus behen* L. Sp. pl. (1753) 414, pro parte. — *S. amoena* With. Bot. arr. Brit. pl. ed. 2, I (1787) 449, non L. — *Lychnis behen* (repens) Hornem. Fl. dan. V, Heft XV (1782) 3, tab. 857. — ? *Cucubalus maritimus* Lam. Encycl. II (1786) 220. — *Silene inflata* δ *maritima* Oth. in DC. Prodr. I (1824) 368. — Ic.: Rchb. Ic. Fl. Germ. VI, tab. 299. — Exs.: HFR no. 2980.

Perennial; stems sprawling, ascending, glabrous, 7–15 cm long; leaves lanceolate, 1–2.5 cm long and 0.3–0.6 cm broad, glabrous, ciliate-margined,

acute, attenuate toward base; flowers solitary or several on the stem; pedicels as long as calyx; bracts lanceolate, herbaceous; calyx broadly campanulate, inflated, 12–16 mm long and 8–14 mm broad, glabrous, with 20 profusely anastomosing nerves, the triangular obtuse teeth with scarious ciliate margin; petals white, one and a half times as long as calyx; limb 2-cleft, the large segments obovate; coronal scales lanceolate, acute; capsule subglobose; carpophore glabrous, 4 mm long. July–August. (Plate XXXV, Figure 5).

Seaside sands and coastal rocks. — Arctic: Arc. Eur. (littoral of Kola Peninsula and Iokan Islands). **Gen. distr.:** Scand., Centr. Eur., British Islands. Described from Europe.

598

4. *S. Cserei* Baumg. Enum. Stirp. Transs. III (1816) 345; Will. in Journ. of Linn. Soc. XXXII (1896) 49. — *S. cserei* Boiss. Fl. Or. I, 629; Shmal'g., Fl. I, 136. — *S. inflata* forma I, Ldb. Fl. Ross. I (1842) 305. — *S. crispata* Stev. in Bull. Soc. Nat. Mosc. XXIX, I (1856) 315. — *S. inflata* γ *spathulata* Rgl. in Bull. Soc. Nat. Mosc. XXXIV, 4 (1861) 547. — *S. fabaria* Rohrb. Monogr. Sil. (1868) 81, ex parte (non Sibth. et Sm.). — *S. fabaria* β *cserei* Rohrb. in Oesterr. bot. Zeitschr. XIX (1868) 268. — Ic.: Acta Hort. Berg. I, no. 6, fig. 34–35 (1891) exs.: HFR no. 2976.

Perennial, glabrous throughout, glaucous; stems ascending or erect at base, 25–45 cm long, branched at summit; leaves rather thick, lanceolate to ovate-lanceolate, sometimes spatulate, more or less crowded on lower part of stem, 2–7 cm long and 0.5–2.0 cm broad, acute to subobtuse, with dentate-ciliate, often undulate margin, the lower tapering to a fairly long petiole, the upper sessile; pedicels short or long; calyx inflated, ovoid-globular or broad-ovoid, 8–13 mm long and 5–10 mm broad, with 20 faintly anastomosing nerves, the teeth acutish; petals white, one and a half to twice as long as calyx; limb parted nearly to base; coronal scales reduced to a pair of bosses; claw enlarged at summit, minutely pubescent on the margin and on the nerves; carpophores 1–2 mm long, covered with very short hairs; capsule ovoid, 13 mm long, 7 mm broad, equaling or slightly exceeding calyx; seeds reniform, concentrically tuberculate. May–July. (Plate XXXV, Figure 3).

Stony slopes, on and around rocks, wood margins; occasionally roadsides and among crops. — European part: L. Don, Bl. Crim.; Caucasus: Main Range, W. Transc. (Novorossiisk). **Gen. distr.:** N. Bal., As. Min. (?). Described from Transylvania.

Note. On the possibility of confusing this species with *S. latifolia* (Mill.) Brit. et Rendle (*S. venosa* auct.) in Ascherson's and Graebner's Synopsis, we find (l. c., page 63) the following note: Vielfach mit breit-blättrigen und kleinblütigen Formen der *S. venosa* verwechselt worden ist. In fact, among the material that I examined, many specimens were found to be erroneously classified under *S. venosa*. In a short note (1928) I already indicated a character which could always be reliably used to distinguish *S. cserei* from *S. latifolia* (*S. venosa*), namely the presence of short hairs on the carpophore of *S. cserei* as opposed to *S. latifolia* in which the carpophore, beside being shorter, is always glabrous.



PLATE XXXV. 1. *Silene conica* L.: flower, petal, calyx, capsule.— 2. *S. conoidea* L.: petal, capsule.— 3. *S. cserei* Baumg.: flower, calyx, capsule with carpophore.— 4. *S. latifolia* (Mill.). Rendle et Britt.: flower, calyx, capsule with carpophore.— 5. *S. uniflora* Roth.

Series 2. **Procumbentes** Schischk. — Calyx pubescent; petals notched.

5. **S. procumbens** Murr. Comment. Goetting. VII (1784) 83; Ldb. Fl. Ross. I, 306; Rohrb. Monogr. 83; Shmal'g., Fl. I, 136; Kryl., Fl. Zap. Sib. V, 1052. — Ic.: Murr., l. c., t. 2; Syreishch., Ill. Fl. Mosk. gub. II, 101. — Exs.: HFR no. 2982.

Perennial; stems profusely branched, decumbent, 10–30 cm long, 4-angled, scabrous, in lower part often glabrate; leaves lanceolate to elliptic-lanceolate, gradually acuminate, 3–9 cm long and 0.4–2 cm broad, glabrous or with scattered short hairs, the margin hispidulous; flowers in a spuriously racemose inflorescence, borne singly at tips of stems and in the leaf axils; pedicels shorter to longer than calyx, covered with short retrorse hairs; bracts resembling leaves but smaller; calyx campanulate, 1.5–2 cm long and 5–7 mm broad, inflated in fruit and then 8–10 mm broad, 20-nerved, puberulent, with obtuse triangular scarious-margined glabrous teeth; petals white, the broadly obcuneate limb notched; coronal scales toothlike, obtuse; claw glabrous, enlarged at summit; capsule globular-ovoid, 5–6 mm long; carpophore glabrous, 2 mm long; seeds ca. 1.5 mm long, smooth or striate. June–August. (Plate XXXVII, Figure 1).

Sandy and sandy-pebbly riverbanks, water meadows, and old fallows. — European part: U. V., V.-Kama, V.-Don, L. Don, L. V., Transv., Bl.; Caucasus: Cisc.; W. Siberia: Ob, U. Tob., Irt.; Centr. Asia: Ar.-Casp. (N. part). Endemic. Described from Siberia.

Series 3. **Fimbriatae** Boiss. Fl. Or. I (1867) 574. — Calyx pubescent; petals fringed-multifid.

6. **S. multifida** (Ad.) Rohrb. Monogr. Silene (1868) 88. — *Cucubalus multifidus* Ad. in Web. et Mohr, Beitr. I (1805) 57. — *C. fimbriatus* Gldenst. Reise II (1791) 24, nomen nud.; M. B. Fl. taur.-cauc. I (1808) 333, descr. — *Silene fimbriata* Sims, Bot. Mag. (1806) tab. 980; Will. in Journ. of Linn. Soc. XXXII (1896) 49; Shmal'g., Fl. I, 136. — Ic.: Sims, l. c. — Exs.: HFR no. 457.

602 Perennial; stems solitary, branched, to 1 m long, covered with simple retrorse hairs, sometimes glandular (var. *glandulosa* Som. et Lev.), rarely glabrate; leaves broad-ovate, 8–9 cm long and 5–6 cm broad, acuminate, rounded or subcordate at base, the lower long-petioled, the upper sessile, glabrous or sparsely hairy above, pubescent beneath especially on the veins, the margin ciliate; flowers numerous at ends of stem and branches; pedicels glandular-pubescent, usually longer than calyx; calyx reticulate-nerved, broadly campanulate, 13 mm long and ca. 8 mm broad, inflated in fruit, glandular-pubescent, the triangular acutish teeth narrowly scarious-margined; petals white, one and a half times as long as calyx; limb obtriangular, dissected into numerous linear segments, gradually narrowing to a glabrous claw; coronal scales none; capsule subglobose, 6 mm long and 5 mm broad; carpophore 3 mm long; seeds dark brown, bluntly tuberculate, ca. 1.75 mm long. June–August.

Groves, often beech woods and their margins, more rarely subalpine meadows at altitudes of about 2,400 m. — Caucasus: Cisc., Gr. Cauc., W. and E. Transc., Dag.? **Gen. distr.:** Lazistan. Described from the Georgian SSR. Type in Moscow.

7. **S. lacera** (Stev.) Sims, Bot. Mag. (1821) tab. 2255; Ldb. Fl. Ross. I, 304, 776; Boiss. Fl. Or. I, 630; Suppl. 102. — *S. multifida* β *lacera* Rohrb. Monogr. (1868) 88. — *Cucubalus lacerus* Stev. in Mém. Soc. Nat. Mosc. III (1812) 262. — *Melandryum lacerum* Will. in Journ. of Linn. Soc. XXXII (1896) 50, 188. — Ic.: Bot. Mag. (1821) tab. 2255; Linn. Transact. XI (1815) tab. 34. — Exs.: HFR no. 1709.

Perennial; stem branched from base; branches ascending, 15–30 cm long, sparsely hairy; lower leaves twice to four times length of blade, this ovate, 2 cm long and 7 mm broad, abruptly contracted or subcordate at base, subacute to obtuse, sparsely hairy like the stem; pedicels shorter to longer than calyx, erect or spreading, often nodding; bracts narrowly lanceolate, herbaceous; calyx broadly campanulate, reticulately nerved, pubescent, with triangular teeth, 16 mm long and 9 mm broad, inflated in fruit; petals slightly longer than calyx, white, more rarely purple, fringed-multifid; coronal scales linear-lanceolate, acute, 3 mm long; claw auriculate at summit, glabrous; capsule sessile, 10 mm long and 7 mm broad; seeds black, flattened, convex on the back, to 2.5 mm long. June–August.

Taluses, stony slopes, and glacial moraines, at altitudes between 1,500 and 3,000 m. — Caucasus: Centr. and E. parts of the Main Range, Dag., E. Transc. (Kyapaz Mountain, Shakh-Dagh Range). Endemic. Described from Khodzhalá River in E. Caucasus. Type in Leningrad (?).

Subgenus 2. **EUSILENE** (Rohrb.) Pax in Nat. Pflanz. III, 1 B. (1889) 71; Williams in Journ. Linn. Soc. XXXII (1896) 54. — *Silenastrum* Rouy, Illustr. pl. Eur. rar. IV (1894–1905) 26. — Calyx 10-nerved, the nerves anastomosing as a rule, rarely not anastomosing.

Section 1. **ODONTOPETALAE** Schischk. — Calyx more or less inflated, pubescent; petal limb usually with a lateral tooth.

303

8. **S. oreina** Schischk. in Acta Inst. Bot. Ac. Sc. URSS. Ser. 1, II (1936) 144. — *S. odontopetala* var. *ovalifolia* Rgl. et Schmalh. Descr. pl. Fedtsch. (1882) 14, non *S. ovalifolia* Preobr. — Exs.: H. F. A. M. no. 183.

Perennial, glandular-puberulent throughout; taproot stout, multicapital, giving rise to numerous flowering stems and short sterile shoots; flowering stems ascending at base, 5–20 cm long; radical leaves lanceolate, 1.5–3 cm long and 2–4 mm broad, acute, long-petioled; cauline leaves ovate to broad-ovate, 1.5–2.5 cm long and 0.6–1.1 cm broad, sessile, rounded at base, short-acuminate; flowers 1–3, terminal; pedicels one-fifth to one-fourth as long as calyx; calyx campanulate, very slightly inflated, 13–15 mm long, glandular-pubescent, the lanceolate teeth 5–6 mm long, terminating in a long slender point; petals white, one and a half times as long as calyx; limb lobed to one-fourth; coronal scales ovate, obtuse; claw glabrous, auriculate at summit; capsule ovoid, ca. 7 mm long; carpophore glabrous, 4 mm long. May. (Plate XXXVI, Figure 1).

Rock crevices. — Centr. Asia: Pam.-Al. (Aksai Mountain in Zeravshan, near the village of Alla-Irishak). Endemic. Described from Aksai Mountain. Type in Leningrad.

9. *S. turcomanica* Schischk. in Acta Inst. Bot. Ac. Sc. URSS. Ser. 1, II (1936) 145.

Perennial; taproot stout, multicapital, giving rise to several flowering stems and numerous sterile shoots; leaves of radical shoots oblong-obovate or lance-ovate, gradually tapering to a broad petiole, with midrib prominent beneath and obsolescent lateral veins, glabrous, finely wrinkled when dry, 3.5–6 cm long and 0.5–1.3 cm broad, acute; cauline leaves 2 or 3 pairs, resembling the radical but smaller, 1.5–2 cm long and 0.4–0.6 cm broad, the margin ciliate at base or naked; stems 6–15 cm long, glabrous in lower half, sparsely covered in upper part with very short glandular hairs; flowers 3–8, crowded at the end of stem and sometimes also on short branchlets in the axils of upper leaves; pedicels pubescent, 2–5 mm long; bracts small, lanceolate, whitish-margined, pubescent; calyx campanulate, very slightly inflated, 12–14 mm long and 3.5–6 mm broad, covered with short glandular hairs, the acuminate teeth 3–3.5 mm long; petals whitish, one and a half times as long as calyx; limb lobed to one-third; coronal scales short, obtusish; claw glabrous, auriculate at summit; capsule ovoid, 8–9 mm long; carpophores 4–6 mm long. July. (Plate XXXVI, Figure 3).

Stones near melting snow. — Centr. Asia: Mtn. Turkm. (Kopet Dag). Endemic. Described from Kopet Dag. Type in Leningrad.

604

10. *S. samarkandensis* Preobr. in Bull. Jard. Bot. Princ. XIX (1919) 10 cum tab. (fig. dextra). — *S. odontopetala* α *typica* Rgl. in A. P. Fedchenko, Puteshestvie v Turkestan, no. 18 (1882) 14. — *S. odontopetala* f. α Kom. in Trud. SPb. Obshch. Estesvoisp. (1896) 125.

Perennial, densely pulvinate; taproot stout, giving rise to few flowering stems and numerous sterile shoots forming leaf rosettes; radical leaves narrowly lanceolate, 10–40 mm long and 1.5–4 mm broad, scabrous on the margin or all over the surface, petiolate; stems ascending at base, 5–10 cm long, bearing 1–3 pairs of sessile leaves 5–10 mm long; flowers solitary or 2 or 3 on the stem; calyx oblong-campanulate, 20–25 mm long and 4–5 mm broad, inflated after flowering and then to 10 mm broad, covered with simple crisp or glandular hairs, the broadly triangular-lanceolate acuminate teeth narrowly scarious-margined; petals white, one and a half times as long as calyx; limb cleft to the middle, with obtuse coronal scales to 2 mm long; claw auriculate at summit; capsule ovoid; carpophore glabrous, 7–8 mm long. June–August. (Plate XXXVI, Figure 2).

Rocks in mountains, at altitudes between 2,000 and 3,300 m. — Centr. Asia: Pam.-Al. Endemic. Described from the Zeravshan River basin. Type in Leningrad.

11. *S. conformifolia* Preobr. in Sched. ad Herb. Inst. Bot. Ac. Sc. URSS. — *S. samarkandensis* subsp. *conformifolia* Preobr. in Bull. Jard. Bot. Princ. XIX (1919) 12. — *S. odontopetala* f. β Kom. in Trud. SPb. Obshch. Estestvoisp. (1896) 125. — Ic.: G. Preobr., l. c., cum tab. ad pag. 12, fig. sinistra.

Perennial, covered in lower part with short simple hairs, in upper part, including calyx, covered with short glandular hairs; taproot branched at summit, giving rise to few flowering stems and numerous short sterile shoots; flowering stems 10–30 cm long; radical leaves lanceolate to lance-ovate, acute, gradually tapering to a petiole, 2.5–5.5 cm long and 4–8 mm broad, glabrous on both sides, with minutely ciliolate margin; cauline leaves

2-4 pairs, resembling the radical but sessile; flowers at the end of stem in a few-flowered dichasium and solitary on branchlets arising from the axils of upper leaves; pedicels 5-10 mm long; calyx cylindric-campanulate, 23-26 mm long and 5 mm broad, inflated after flowering and then to 10 mm broad, the broadly triangular short-acuminate teeth ca. 5 mm long; petals white or pink, one and a half times as long as calyx, the limb cleft to the middle into oblong lobes; capsule ovoid, to 10 mm long; carpophore glabrous, 12-15 mm long. July - August. (Plate XXXVI, Figure 5).

5 Stony slopes and calcareous rocks, at altitudes up to 3,000 m. - Centr. Asia: Pam.-Al. (Gissar Range - Pakshif pass, Zeravshan - Langlif Pass and Vakhsh Range - environ of Kamomi, Darvaza - Khobu - Rabot - Dzhamak). Endemic. Described from Pashkif and Langlif mountain passes. Type in Leningrad.

12. *S. michelsoni* Preobr. in Bull. Jard. Bot. Princ. XIX (1919) 13 cum fig.

Perennial; taproots stout, multicipital, the root collar densely covered with decayed leaves; rosulate leaves oval-spatulate, acuminate, scabrous; stems lateral, 30-40 cm long, covered with short hairs; cauline leaves 3 or 4 pairs, pubescent, resembling the radical but smaller; flowers 5-13 in a paniculate-racemose inflorescence, short-pedicel; calyx cylindric-campanulate, inflated, 13-15 mm long and 5-6 mm broad, in fruit to 10 mm broad, covered with simple spreading white hairs, the teeth triangular-lanceolate; petals white, one and a half times as long as calyx; limb lobed to one-third into oval obtuse lobes, with marginal teeth and obtuse coronal scales, the claw auriculate at summit; capsule ovoid, 10 mm long; carpophore glabrous, 6-7 mm long; capsule ovate, 10 mm long. June - July. (Plate XXXVI, Figure 4).

Rocks. - Centr. Asia: Pam.-Al. Described from the Sangardak River Pass, on Gissar Range. Endemic. Type in Leningrad.

13. *S. adenopetala* H. Raik. in Not. Syst. Herb. Horti Bot. Petropol. IV (1923) 169 and in Opred. rast. okr. Tashkenta, no. 2 (1923) 112.

Perennial, densely glandular-pubescent throughout; taproot stout; sterile shoots forming basal rosettes; radical leaves lanceolate or ovate-oblong, acute, petiolate, 3-4.5 cm long and 5-12 mm broad; flowering stems ascending at base, 12-20 cm long, bearing 3 or 4 leaf pairs; cauline leaves sessile, resembling the radical but shorter; flowers 1-5 on the stem; pedicels 3-10 mm long; calyx 20-23 mm long, at anthesis oblong-campanulate and 3-4 mm broad, after flowering inflated and 5-7 mm broad, the narrowly linear slender-pointed teeth one-fourth the length of calyx; petals whitish, one and a half times as long as calyx; limb 5 mm long, lobed to one-third, with marginal teeth, glandular-pubescent on the outside; coronal scales obtuse, to 2 mm long; claw auriculate at summit, glandular on the outside; capsule ovoid, 10 mm long; carpophore glandular-pubescent, to 10 mm long; seeds angular-reniform, tuberculate, 1.5-2 mm long. August.

Rock crevices. - Centr. Asia: T. Sh. Endemic. Described from Ak-Bashtau. Type in Tashkent; cotype in Leningrad.

14. *S. raddeana* Trautv. in A. H. P. II (1873) 472; Williams in Journ. of Linn. Soc. XXXII (1896) 38; Grossg., Fl. Kavk. II, 411.

Perennial, densely tufted; root multicipital, giving rise to numerous abbreviated sterile shoots; flowering stems arising laterally from the



PLATE XXXVI. 1. *Silene oreina* Schischk. — 2. *S. samarkandensis* Preobr.: petal, capsule with carpophore. — 3. *S. turcomanica* Schischk.: petal. — 4. *S. michelsoni* Preobr. — 5. *S. conformifolia* Preobr. — 6. *S. raddeana* Trautv.

radical rosette; stems 5–10 cm long, 1- or 2-flowered, covered in lower part with simple retrorse hairs, stringy above, bearing 2 or 3 leaf pairs; radical leaves linear, 1.5–2.5 cm long and 1–2 mm broad, acute, glabrous, rugose, with hirtellous margin; cauline leaves resembling the radical but smaller, 0.7–1 cm long and 2–3 mm broad; pedicels 1–4 mm long; bracts herbaceous, ca. 5 mm long; calyx inflated, 12–15 mm long and 5–8 mm broad, glandular-pubescent, with acuminate teeth; petals white, one and a half times as long as calyx; limb parted to two-thirds into broad-ovate lobes, with marginal teeth; coronal scales suborbicular, 0.5–1 mm long; claw glabrous, auriculate at summit; capsule ovoid, 6–8 mm long; carpophore glabrous, ca. 4 mm long. July–August. (Plate XXXVI, Figure 6).

Stony slopes in the alpine zone. — Caucasus: S. Transc. **Gen. distr.:** Arm.-Kurd. Described from Kazikoparan and Ashikh-Dad. Type in Leningrad.

15. **S. physocalyx** Ldb. Fl. Ross. I (1842) 321; Grossg., Fl. Kavk. II, 411.

Perennial; stems solitary to several, ascending, 10–12 cm high, covered with short crisp hairs; radical leaves lanceolate, acute, 3–4 cm long and 3–4 mm broad, with short recurved hairs; cauline leaves similar but smaller; flowers 2 or 3 at the end of stem; calyx inflated, ca. 10 mm long and 5–7 mm broad, covered with short crisp hairs interspersed with glandular; petals white, one and a half times as long as calyx, the limb lobed to one-third, with ovate coronal scales to 1.5 mm long. July.

Rocks. — Caucasus: W. Transc. (?). **Gen. distr.:** known from adjoining part of Turkey (vicinity of Artvin). Described from W. Transcaucasia (without precise indication of location). Type in Leningrad.

*16. **S. artwinensis** Schischk. in Ber. d. Toms. Staatl. Univers. 77, 3 (1927) 291; Grossg., Fl. Kavk. II, 411.

Perennial, covered throughout with glandular hairs; stems numerous, 15–20 cm long, densely clothed at base with remnants of dead leaves; radical leaves linear-spatulate, 5–6 cm long and 2–5 mm broad, 1-veined, petiolate; cauline leaves lanceolate, 5–12 mm broad, acute, obscurely 3-veined, exceeding internodes; flowers 3–7 at the end of stem, short-pedicelled; bracts herbaceous; calyx broadly campanulate, inflated, 15 mm long and 8–10 mm broad, glandular-pubescent, with lanceolate acuminate teeth; petals white, one and a half times as long as calyx; limb lobed to one-third, with ovate obtuse basal appendages; claw glabrous, auriculate at summit; capsule (immature) ovoid, 6 mm long, about equaling the glabrous carpophore. July.

Not found so far in the USSR, known from the vicinity of Artvin. Endemic. Described from near the village of Khantushet. Type in Tiflis.

17. **S. lazica** Boiss. Diagn. Pl. nov. ser. I, 1 (1842) 35; Fl. Or. 1, 624; Rohrb. Monogr. 142; Williams in Journ. of Linn. Soc. XXXII (1896) 101; Grossg., Fl. Kavk. II, 410.

Perennial; stems numerous, erect, 15–20 cm long, glandular-pubescent as are the leaves; radical leaves soon wilting; cauline leaves 5–8 pairs, rounded-ovate, 1.5–3 cm long and 1–2.5 cm broad; acuminate, sessile, subcordate at base, sometimes undulate-margined, longer or very slightly shorter than internodes; flowers at tips of stems and branches in 3-flowered dichasia; pedicels shorter than calyx; calyx cylindric, 22–26 mm long and ca. 5 mm broad, densely glandular-pubescent, with acuminate lanceolate teeth;

petals white, one and a half times as long as calyx; limb 2-cleft to the middle, with linear marginal teeth and oblong obtuse coronal scales ca. 2 mm long; claw auriculate at summit; capsule ovoid, 10 mm long and 5 mm broad; carpophore glabrous, as long as capsule. July–August.

Rocks. — Caucasus: W. Transc. **Gen. distr.:** Turkish Lazistan. Described from Lazistan Mountain. Type in Geneva.

18. **S. commelinifolia** Boiss. Diagn. Pl. nov. ser. I, 1 (1842) 35; Fl. Or. I, 624; Rohrb. Monogr. 128; Williams in Journ. of Linn. Soc. XXXII (1896) 84.

610 Perennial, woody at base; stems numerous, herbaceous, 10–15 cm long, glandular-puberulent as are the leaves; lower leaves lance-linear, gradually tapering to a long ciliate petiole and together with it 4–5 cm long, 2–3 mm broad; upper cauline leaves sessile, ovate-lanceolate, 12–15 mm long and 5–7 mm broad, acute, prominently 3–5-veined beneath; flowers solitary or in 3-flowered dichasia at tips of stems and branches; bract herbaceous, lanceolate; calyx cylindric, 2.5–2.8 cm long, glandular-hairy, with lanceolate long-acuminate teeth; petals lurid, ca. 3.5 cm long; limb cleft to the middle into oblong lobes, with coronal scales ca. 1 mm long; claw enlarged at summit, glabrous; capsule ovoid, tapering at the top, 9–10 mm long and 5 mm broad; carpophore pubescent in lower part, as long as capsule; seeds rounded-reniform, striate, ca. 2 mm long. May.

Rocks. — Caucasus: S. Transc. (Bechenakh, Ordubad, between Negram and Kyzyl-Vank). **Gen. distr.:** Arm.-Kurd., N. Iran. Described from Iran (Zerdkhou Mountain) and Armenia. Type in Geneva.

Section 2. **CINCINOSILENE** Rohrb. Monogr. Silene (1868) 67, 93. — *Lasiocalycinae* Boiss. Fl. Or. I (1867) 569, ex parte. — Inflorescence racemose, more or less elongate, simple or more often dichotomously branched, the lower flowers minutely pedicellate, the upper sessile; annuals or biennials.

Series 1. **Dichotomae** Rohrb., l. c. — Bracts herbaceous; inflorescence with short-pedicel alar flowers.

19. **S. dichotoma** Ehrh. Beitr. VII (1792) 144; Ldb. Fl. Ross. I, 315 (part.); Rohrb. Monogr. Silene, 94, excl. var.; Shmal'g., Fl. I, 137; Kryl., Fl. Zap. Sib. V, 1054. — Ic.: Rchb., Ic., Fl. Germ. VI, t. 280.

Annual or biennial; stem 40–70 cm long, crisp-pubescent, branched; leaves ovate-lanceolate, 4–5 cm long and 1.5–2 cm broad, acute, 3–5-veined on both surfaces, covered with appressed crisp hairs; leaves of axillary fascicles narrower; flowers at tips of stem and branches, the lower with petioles 1–2 mm long, the upper sessile, usually horizontally spreading at anthesis, ascending in fruit; bracts lance-linear, ca. 5 mm long, scarious on the margin or throughout; calyx 11–13 (15) mm long, 3–4 mm broad, covered with stiffish recurved or subpatulous hairs, the lanceolate acute teeth to 3 mm long; petals white, one and a half times as long as calyx; limb parted to two-thirds into oblong lobes, with coronal scales to 1/2 mm long; capsule ovoid; carpophore glabrous, 1–2 mm long; seeds reniform, 1.5 mm long and 1 mm broad, dull, slightly tuberculate. End of May, June–July. (Plate XXXVII, Figure 5).

Among crops and borders of plowfields. — European part: Lad.-Ilm., Dv.-Pech (Velsk), U. Dnp., M. Dnp., U. V., V.-Kama, Transv. (very infrequently

Bl., V.-Don, L. Don, Crim.; Caucasus: Cisc.; W. Transc. (Abrau, Novorossisk); W. Siberia: Ob (Tobol). **Gen. distr.:** Scand., Centr. Eur., and naturalized in N. America. Described from Hungary (?).

Economic importance. A widespread weed of cereal crops, clover, alfalfa, etc.

20. *S. iberica* M. B. Fl. taur.-cauc. I (1808) 335; Schischk. in Bull. Mus. Géorgie I (1920-22) 4; Gross., Fl. Kavk. II, 406. — *S. racemosa* γ *IB E iberica* Boiss. Fl. Or. I (1867) 589. — *S. dichotoma* var. *iberica* Trautv. in A. H. P. IV, 2 (1878) 354; Williams in Journ. of Linn. Soc. XXXII (1896) 55. — Exs.: HFR no. 2856.

Annual or biennial; stem 30-80 cm long, branched from base, crisp-puberulent; leaves oblong-lanceolate, 5 cm long and 1.5 cm broad, short-hairy, acute, tapering to a fairly long petiole; upper leaves linear, smaller; flowers at tips of stem and branches in rather short 1-sided racemes, the lower on pedicels 1-2 mm long, the upper sessile, erect or divergent or deflexed, in fruit always erect and appressed to rachis; bracts lanceolate, 5-6 mm long, acute, ciliate-margined, the lower herbaceous with a rather broad scarious margin, the upper scarious throughout, slightly suffused with rose-violet; calyx doliform or broad-ovoid, sometimes subglobose, 7-10 (11) mm long and 4-6 mm broad, slightly pubescent or subglabrous, with acute teeth; petals white, twice as long as calyx; limb parted to four-fifths into linear-oblong lobes, with basal appendages 0.5 mm long; claw glabrous; capsule broad-ovoid, 5.5 mm long and 4.5 mm broad; carpophore glabrous, 2.5 mm long. May-August. (Plate XXXVII, Figure 2).

Stony slopes, pebbly riverbanks, and fields. — Caucasus: Dag. (very infrequently), E., W. (Adzhariya) and S. Transc. **Gen. distr.:** As. Min. (N. part). Described from Georgia. Type in Leningrad.

Economic importance. Often occurring in Transcaucasia as a weed of cereal crops.

21. *S. talyschensis* Schischk. in Bull. du Museum de Géorgie I (1920-22) 7; Grossg., Fl. Kavk. II, 407. — Ic.: Schischk., l. c., tab. II.

Biennial, crisp-puberulent throughout; stem branched almost from base, 20-40 cm long; leaves ovate, ca. 3 cm long and 1-1.5 cm broad, thickish, acute or obtuse, short-petioled; flowers subsessile, in short racemes; bracts lanceolate, acute, scarious; calyx cylindric, 11 mm long and 4 mm broad, densely covered with soft hairs to 4 mm long; teeth ovate-lanceolate, with scarious ciliate margin; petals white, about twice as long as calyx; limb 2-parted to four-fifths into oblong lobes, with quadrangular-orbicular coronal scales; capsule ovoid, five to six times as long as carpophore; seeds triangular-reniform, tuberculate. May-June.

Mountain meadows and slopes. — Caucasus: Tal. Endemic. Described from Zuvant. Type in Tiflis.

22. *S. thirkeana* C. Koch in Linnaea XIX (1847) 56; Grossg., Fl. Kavk. II, 407. — *S. racemosa* β *sibthorpiana* Boiss. Fl. Or. I (1867) 589, ex parte.

Biennial; stem 40-70 cm long, crisp-puberulent as are the leaves, branched from base; leaves oblong-lanceolate, 3-7 (10) cm long and 1-3 (5) cm broad, sparsely hairy above, more profusely beneath, especially on the veins, acute, tapering to a rather long petiole, this sometimes equaling the blade; flowers in 1-sided racemiform inflorescences 10-30 cm long,

short-pediceled; upper bracts scarious, sometimes purple-tinged; calyx crisp-puberulent, 10–11 mm long and 3–4 mm broad; petals white; limb cleft to the middle or two-thirds, with coronal scales at base; capsule ovoid, 7 mm long and 5 mm broad; carpophore 1.5 mm long; seeds bluntly tuberculate, to 1.5 mm long. June–August.

Dry slopes and as a weed among crops. — Caucasus: S. Transc. **Gen. distr.:** E. Med., As. Min., Arm.-Kurd. Described from Asia Minor. Type in Berlin; cotype in Leningrad.

23. *S. euxina* Rupr. Fl. Cauc. (1869) 184; Schischk. in Bull. du Mus. de Géorgie I (1920–22) 8. — *S. dichotoma* γ Ldb. Fl. Ross. I (1842) 315. — *S. racemosa* δ *rubriflora* Boiss. Fl. Or. I (1867) 589. — *S. racemosa* ϵ *euxina* Boiss. Suppl. (1883) 92; Williams in Journ. of Linn. Soc. XXXII (1896) 56. — Ic.: Ann. Nat. Hofm. Wien XXIII (1909) t. 8, fig. 3.

Biennial, crisp-pubescent throughout; stem branched from base, ascending, 12–50 cm long, clothed at the collar with remnants of dead leaves; basal leaves oblong-spatulate, acute; cauline leaves narrower, 1-veined, ca. 3 cm long and 3–7 mm broad; bracts lanceolate, scarious; inflorescence racemose; pedicels 2–4 mm long, at anthesis sometimes divergent, after flowering appressed to rachis; calyx crisp-hairy, cylindric, 10–12 mm long and 3 mm broad, prominently nerved, the teeth obtuse; petals purplish-red, about twice as long as calyx; limb parted nearly to base into oblong lobes, with minute orbicular basal appendages; capsule ovoid, three times as long as carpophore; seeds reniform, tuberculate, ca. 1 mm long. June–August.

Seaside sands. — Caucasus: W. Transc. (Gudaut to Batum). **Gen. distr.:** Lazistan, Anatolia. Described from the environs of Poti. Type in Leningrad.

Series 2. *Scorpioideae* Rohrb. Monogr. *Silene* (1868) 67, 96. — Bracts scarious; alar flowers none; inflorescence fully 1-sided.

24. *S. anglica* L. Sp. pl. (1753) 416. — *S. gallica* L., l. c., 417; Ldb. Fl. Ross. I, 315; Boiss. Fl. Or. I, 590; Rohrb. Monogr. *Silene* 96; Shmal'g., Fl. I, 137. — *S. lusitanica* L., *S. quinquevulnera* L. Sp. pl. (1753) 416. — Ic.: Rchb. Ic. Fl. Germ. VI, tab. 272.

613 Biennial; stem ascending or erect, branched or more rarely simple, 15–30 cm long, covered with long patulous simple as well as short glandular hairs; leaves oblong-spatulate or lanceolate, 1.5–3 cm long and 2–7 mm broad, covered like the stem with simple and glandular hairs; inflorescence a simple 1-sided raceme; pedicels short; bracts herbaceous, lance-linear; calyx tubular, 8 mm long and 2–3 mm broad, somewhat inflated in fruit, tapering at summit, with nonanastomosing nerves, covered with long patulous simple as well as short glandular hairs; teeth linear-lanceolate acute; petals white or purple, longer than calyx; limb obovate, notched or crenate at apex, with coronal scales at base; filaments hairy in lower part; capsule oblong-ovoid, subsessile; seeds reniform, ca. 1 mm long, blackish, convex on the back, slightly tuberculate. May–June. (Plate XXXVII, Figure 3).

Sandy shores, gardens, and cultivated fields. — European part: U. Dnp.; Caucasus: Cisc., W. Transc., Tal. **Gen. distr.:** Centr. and Atl. Eur., W. and E. Med., Bal.-As. Min., Iran. (Pahlevi); almost universally introduced. Described from France. Type in London.

25. *S. brachypetala* Rob. et Cast. ex DC. in Lam. et DC. Fl. France V, Suppl. (1815) 607; Williams in Journ. of Lin. Soc. XXXII (1891) 59; Grossg., Fl. Kavk. II, 406. — *S. nocturna* β *pauciflora* Otth in DC. Prodr. I (1824) 372. — *S. nocturna* var. *brachypetala* Benth. Cat. Pyren. (1826) 122; Rohrb. Monogr. *Silene* 101. — Ic.: Rchb. Ic. Fl. Germ. f. 5058.

Annual; stems 8–20 cm long, branched from base in lower part minutely hirtellous, in upper part glandular; basal leaves spatulate, obtuse, ca. 3 cm long and ca. 1 cm broad, tapering to a rather broad petiole, the median narrower, the upper linear; margin beset with leaves with long white cilia especially in lower part; leaves of fascicles in the axils of cauline leaves narrow; flowers in an obscurely 1-sided raceme; pedicels 1.5–3 mm, rarely to 8 mm long; bracts linear; calyx with 10 green nerves profusely anastomosing in upper part, 7–10 mm long, with lanceolate acute teeth, heavily hirtellous; petals white, to 2.5 mm long, notched, without coronal scales, gradually tapering to a short glabrous claw; filaments subglabrous; capsule oblong, 9 mm long and 3 mm broad; carpophore 0.5–5 mm long, covered with very short hairs; seeds reniform, grooved on the back, short-tubercled, with auriculately concave faces, grayish-rufescent, to 1/2 mm long. June

Seaside sands. — Caucasus: Tal. (Sara Island). Gen. distr.: W. and E. Med. Described from S. France (vicinity of Marseilles). Type in Paris.

26. *S. pendula* L. Sp. pl. (1753) 418; Boiss. Fl. Or. I, 590; Rohrb. Monogr. *Silene* 111; Williams in Journ. of Linn. Soc. XXXII (1896) 69; Shmal'g., Fl. I, 137; Grossg., Fl. Kavk. II, 412. — Ic.: Rchb. Ic. Fl. Germ., t. 279, f. 5070.

Annual or biennial, patulously soft-hairy, with glandular hairs at summit; stem 10–35 cm long, branched from base, ascending; leaves ovate-lanceolate to oblong, tapering to a fairly long petiole or the upper sessile, acute or the lower obtuse, 3 cm long and 0.5–1.5 cm broad; flowers in a racemiform sometimes 1-sided inflorescence; pedicels 0.5–1.5 cm long; bracts herbaceous, lanceolate; calyx glandular-pubescent, oblong, 13–15 mm long, somewhat inflated and pendulous in fruit, with 10 prominent almost winged nerves; teeth ovate, obtuse; petals roseate, about twice as long as calyx; limb deeply notched, with oblong obtuse coronal scales 1 mm long; claw glabrous; capsule ovoid, 9 mm long and 5 mm broad; carpophore glabrous, 3–5 mm long; seeds reniform-orbicular, ca. 1 mm long, minutely and sharply tuberculate, grooved on the back. June–July.

Cultivated ground, vegetable and ornamental gardens. — European part: U. Dnp., M. Dnp.; Caucasus: Cisc., W. Transc. Gen. distr.: Atl. Eur., Med., As. Min., cultivated and introduced in Centr. Eur. Described from Crete and Sicily. Type in London.

Series 3. *Dipterospermae* Rohrb. Monogr. *Silene* (1868) 69, 114. — Seeds deeply and narrowly grooved on the back, the groove flanked by 2 undulate wings; inflorescence monochasial; annual plants.

27. *S. apetala* Willd. Sp. pl. ed. IV, II (1799) 703; Boiss. Fl. Or. I, 596; Rohrb. Monogr. 118; Williams in Journ. of Linn. Soc. XXXII (1896) 74. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 275, f. 5060.

Annual, appressed-puberulent; stem 10–30 cm long, branched in upper half; leaves lance-linear, 1–2.5 cm long and 2–4 mm broad; pedicels 2–3 cm long; calyx campanulate-clavate, 6–8 mm long, the nerves not

anastomosing, the triangular-lanceolate acute teeth with scarious ciliate margin; petals none or linear, shorter to rarely very slightly longer than calyx, the limb 2-lobed; capsule globular, 5 mm long; carpophore glabrous, 1 mm long; seeds rounded-reniform, ca. 1 cm [?] long, with 2 approximate thickish dorsal wings. April.

- 615 Stony slopes. — Centr. Asia: Mtn. Turkm. (Balkhan Bay). **Gen. distr.:** W. and E. Med., As. Min., Iran., Ind.-Him., Afr. (Abyssinia). Classical location unknown. Type in Berlin.

Section 3. **COMPACTAE** Boiss. Fl. Or. I (1867) 569. — Petals entire, rosy-purple, with large coronal scales; flowers perfect, crowded in a terminal head or a compact corymb.

28. **S. compacta** Fisch. Hort. Gorenk. (1812) 60 nom. nud.; in Hornem. Hort. Halfn. I (1813) 417; Ldb. Fl. Ross. I, 325; Boiss. Fl. Or. I, 582. — *S. armeria* subsp. *β compacta* Schmalh., Fl. I. (1895) 138. — *S. armeria* var. *compacta* Fedtsch. et Fler., Fl. Evr. Ross. II (1909) 396. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 284. — Exs.: HFR no. 2974; Herb. Fl. cauc. no. 228.

Annual or biennial; stem 20–70 cm long, erect, simple or slightly branched in upper part, glaucescent as are the leaves; lower leaves spatulate; middle leaves ovate-lanceolate, sessile, rounded or subcordate at base, acute or obtuse, 2.5–8 cm long and 7–35 mm broad; bracts ovate, acuminate, 7–8 mm long, whitish-membranous, with a brownish midrib; flowers short-pedicel, crowded in a compact inflorescence at tips of stem and branches; calyx cylindric, 24 mm long; limb light purple, entire; coronal scales linear-lanceolate, acute, 3–4 mm long; claw auriculate at summit; capsule 6–7 mm long, 2.5 mm broad; carpophore 9–10 mm long; seeds 0.5 mm in diameter, reniform-orbicular, bluntly tuberculate, grooved on the back. June–July.

Open woods, coppices, sandy riverbanks, field borders, and plowfields. — European part: Bl.; Caucasus: Cisc., Main Range, Dag., W., E., and S. Transc., Tal. **Gen. distr.:** Bal.-As. Min., Arm.-Kurd. Described from Russia.

Economic importance. Often cultivated in gardens for ornament.

29. **S. armeria** L. Sp. pl. (1753) 420; Ldb. Fl. Ross. I, 325; Shmal'g., Fl. I, 138. — Ic.: Hegi Ill. Fl. Mittel-Eur. III, t. 99. — Exs.: HFR no. 2010.

- 616 Annual; stem 20–50 cm long, erect, simple or in upper part slightly branched, glabrous and glaucescent as are the leaves; lower leaves spatulate; middle leaves ovate-lanceolate, acute, sessile, subcordate at base, 3–7 cm long and 0.7–3 cm broad; bracts acuminate, 7 mm long, scarious; inflorescence corymbose-paniculate; pedicels short; calyx cylindric-clavate, 14–16 mm long, 2.5 mm broad, the obtuse teeth ciliate; petals one and a half times as long as calyx; limb light purple, entire, obovate-cuneate, notched; coronal scales lanceolate, acute; 3–4 mm long; claw auriculate at summit; capsule ovoid, 6–7 mm long; carpophore 5–6 mm long; seeds 0.5 in diameter, bluntly tuberculate. June–July.

Fields, vegetable and ornamental gardens. — European part: U. Dnp., M. Dnp.; E. Siberia: Dau. (introduced). **Gen. distr.:** Centr. and Atl. Eur., W. Med.; introduced in India, N. America, and Brazil. Described from France. Type in London.

Economic importance. Sometimes cultivated in gardens for ornament.

Section 4. **CHLORANTHAE** Rohrb. Monogr. (1868) 74. — Petals yellowish-green, rarely roseate or purple, parted nearly to base; calyx rather small, mostly glabrous, rarely scabrous-pubescent.

Series 1. **Ecoronatae** Schischk. — Coronal scales none or reduced to 2 bosses; sterile shoots in the leaf axils wanting or little developed.

30. **S. chlorantha** (Willd.) Ehrh. Beitr. VII (1792) 144; Ldb. Fl. Ross. I, 319; Rohrb. Monogr. 184; Williams, Revisio Silene 141; Shmal'g., Fl. I. 141; Kryl., Fl. Zap. Sib. V, 1056. — **Cucubalus chloranthus** Willd. Prodr. Fl. Berol. (1787) 155. — **Silene elata** Otth in DC. Prodr. I (1824) 370. — **S. subspatulata** Schur, Enum. transsilv. (1866) 102. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 293. — Exs.: HFR no. 56; Fl. polon. exs. no. 317.

Perennial; stem erect, unbranched, glabrous, 30–80 cm long; radical leaves lanceolate, 3–9 cm long and 4–9 mm broad, tapering to a rather long petiole, short-acuminate, with a rough margin; cauline leaves smaller, linear-lanceolate to linear; inflorescence a slender 1-sided racemiform panicle, the 3–many-flowered branches appressed to stem or ascending; flowers nodding or deflexed; pedicels longer than calyx; bracts ovate-lanceolate, scarious, the margin ciliate; calyx tubular, 9–12 mm long and 2–3 mm broad, glabrous, with obtuse teeth and inconspicuous nerves; petals greenish-yellow, one and a half times as long as calyx; limb cleft to the middle into linear lobes, bossed at base; claw glabrous-auriculate and fringed at summit; capsule ovoid, 8 mm long and 4 mm broad; carpophore pubescent or subglabrous, to 2 mm long. July–September.

Steppes, open woods, wood margins, sandy or stony, often calcareous, slopes, and fallows. — European part: Lad.-Ilm., U. V., V.-Kama, Ural, U. Dnp., M. Dnp., V-Don, Transv., Bl., Crim. (?), L. Don, L. V.; Caucasus: Cisc. (Stavropol); W. Siberia: U. Tob., Irt., Alt.; E. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say. (Minusinsk); Centr. Asia: Ar.-Casp. (N.), Balkh. (N.). **Gen. distr.:** Centr. Eur., (E. part). Described from Prussia (Spandau). Type in Berlin.

Note. The flowers emit in the evening a scent reminiscent of that of *Platanthera*.

31. **S. multiflora** (Ehrh.) Pers. Syn. I (1805) 497; Ldb. Fl. Ross. I, 311; Shmal'g., Fl. I. 141. — **Cucubalus multiflorus** Ehrh. Beitr. VII (1792) 141.

Perennial; stem erect, simple, 40–90 cm long, puberulent in lower part, usually glabrous above; radical and lower cauline leaves spatulate, 7 cm long and 1–2 cm broad, subobtuse, tapering to a long petiole, scabrous-pubescent, with ciliate margins; upper cauline leaves lance-linear, short-acuminate, sessile; inflorescence a racemiform panicle; pedicels glabrous or more rarely puberulent, one-fifth to half as long as calyx; calyx cylindric-clavate, 10–15 mm long and ca. 2 mm broad, smooth or with very short crisp hairs, the obtuse teeth ciliate on the scarious margin; petals white, one and a half

times as long as calyx; limb parted nearly to base; coronal scales none or very small; claw ciliate; capsule oblong-ovaloid, 7–8 mm long; carpophore 6 mm long, short-hairy. June–July.

Steppe and water meadows; open woods. — European part: M. Dnp., Bl., V.-Don. L. Don, Transv., L. V., V.-Kama; W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Ar.-Casp. **Gen.distr.:** Hungary, Transylvania, Dobruja. Described from Hungary (?).

32. *S. gawrilowii* Krassn. in sched. ad Herb. Inst. Bot. Acad. Sc. URSS. — *S. holopetala* var. *gawrilowii* Krassn., Opyt razv. Fl. Vost. Tien Shan (1888) 336. — *S. gawrilowii* (Krassn.) M. Pop. in textu sub *S. praemixta* M. Pop. in Bull. Univ. As. centr. IX, Suppl. (1925) 37.

Perennial; stems several, 25–35 cm long, simple, glabrous; lower leaves spatulate or narrowly obovate, 1.5–3 cm long and 5–7 mm broad, acute or obtuse, sparsely ciliate at base, tapering to petiole the length of blade; upper leaves smaller, sometimes with axillary fascicles; flowers in a long slender racemiform panicle; pedicels glabrous, 5–7 mm long; calyx clavate, 8–10 mm long, glabrous, the obtuse teeth broadly scarious-margined and ciliate; petals white, one and a half times as long as calyx; limb parted nearly to base into obovate lobes, without coronal scales; claw densely ciliolate, especially in lower part; filaments glabrous; capsule ovoid, 5–6 mm long; carpophore puberulent, 2 mm long; seeds triangular-reniform, ca. 1 mm long. May–June.

Conglomerates. — Centr. Asia: T. Sh. Endemic. Described from Ketmen pass. Type in Leningrad.

618 33. *S. balchaschensis* Schischk. Acta Inst. Bot. Ac. Sc. URSS. Ser. I, III (1936).

Perennial; taproot stout, vertical or ascending, multicipital; stems several, ascending at base, 15–30 cm long, glabrous; radical leaves linear to linear-lanceolate, 2–3 cm long and 1–3 mm broad, acute, the margin ciliolate; cauline leaves lanceolate to linear, 2–4 cm long and 1–5 mm broad, the lower petioled, the upper sessile; flowers in a slender racemiform panicle; pedicels glabrous, 5–10 mm long, often nodding; bracts lanceolate, the scarious margin ciliate; calyx clavate, ca. 8 mm long, glabrous, the obtuse scarious-margined teeth sparingly ciliate; petals greenish-yellow or lurid, one and a half times as long as calyx; limb 2-parted nearly to base into obovate lobes, without coronal scales; claw obscurely ciliate or subglabrous; filaments glabrous; capsule ovoid, 5 mm long; carpophore scabrous, 2–3 mm long. June.

Gravelly slopes and wormwood-and saltwort semidesert. — Centr. Asia: Balkh. (Bertys, Ak-Dzhar, Altyn-Emel). Endemic. Described from Bertys Bay. Type in Leningrad.

34. *S. glaucescens* Schischk. in Acta Inst. Bot. Ac. Sc. Ser. 1, III (1936).

Perennial; stems numerous, very rarely 2, erect, 30–60 cm long, glabrous, glaucous, branched; radical leaves soon wilting, 2–5.5 cm long and 0.7–1.5 cm broad, tapering to a long petiole; cauline leaves sessile or gradually tapering to a short somewhat ciliate petiole, obovate, 3–4 cm long and 1–1.5 cm broad, thickish, acute or short-acuminate, often with

axillary fascicles of narrower leaves; flowers at tips of stems and branches in long racemiform panicles; pedicels stoutish, 4–10 mm long; calyx cylindric-clavate, 7–10 mm long, glabrous, the obtuse teeth scarious-margined and densely ciliate; petals greenish-yellow; limb parted nearly to base into oblong lobes, without coronal scales; claw minutely ciliolate in lower part; filaments glabrous; capsule broad-ovoid, 7 mm long; carpophore glabrous, 1–3 mm long; seeds reniform, finely striate, ca. 1.5 mm long. June. Solonetz desert steppes. — Centr. Asia: Syr D. Endemic. Described from Kabadian, Kokand district. Type in Leningrad.

35. *S. lithophila* Kar. et Kir. in Bull. Soc. Natur. Moscou, XV (1842) 167; Ldb. Fl. Ross. I, 776; Rohrb. Monogr. 193.

199 Perennial, very slightly woody at base; stem erect or ascending, simple or with few ascending branches, 10–25 cm long, glabrous; leaves linear, the radical numerous, the cauline 2 or 3 pairs, distant, 2–6 cm long and 1–2 mm broad, acute, scabrous-margined, erect or falcately recurved, often with axillary fascicles of narrower leaves; flowers solitary or 3–5 on the stem, erect or horizontally spreading or very rarely pendulous; pedicels terminal or axillary, 2–5 times as long as calyx; bracts linear, the broadly membranous margin ciliate; calyx cylindric, 10–11 mm long, 2 mm broad, glabrous, with short triangular obtuse teeth and 10 broad violet-tinged nerves; petals whitish or dark purple, about twice as long as calyx; limb parted nearly to base into linear lobes, without coronal scales, the claw enlarged at summit; capsule ovoid, 7–8 mm long and 3–4 mm broad; carpophore glabrous, 4 mm long. July.

Rocks and stony slopes. — Centr. Asia: Dzu.-Tarb., T. Sh. Endemic. Described from Dzhungarian Ala-Tau (Leps stream). Type in Leningrad.

Note. A species displaying variability only in the lower part of its distribution area where forms occur with a taller branched many-flowered stem, the petal limb sometimes with basal teeth (var. *tianschanica* Schischk.).

Series 2. *Tataricae* Schischk. — Fascicles of narrower leaves present in the axils of cauline leaves.

36. *S. tatarica* (L.) Pers. Syn. I (1805) 497; Ldb. Fl. Ross. I, 312; Shmal'g., Fl. I, 141; Kryl., Fl. Zap. Sib. V, 1057. — *Cucubalus tataricus* L. Sp. pl. (1753) 415. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 292; Syreishch., III. Fl. Mosk. gub. II, 102.

Perennial; stem erect, very slightly woody at base, simple or somewhat branched, 25–100 cm long, sparsely covered with crisp hairs and often reddish at base, glabrous elsewhere; lower leaves wilting at anthesis; middle cauline leaves lanceolate, 3.5–5 cm long and 4–6 mm broad, acute, tapering at base to a short petiole, ciliate-margined, with axillary fascicles of narrower leaves; panicle racemiform, sometimes secund; pedicels shorter than to twice or thrice as long as calyx, crisp-hairy in upper part; calyx 10–11 mm long and 2.5 mm broad, glabrous, with acute teeth, often reddish like the stem; bracts lanceolate, ca. 6 mm long, scarious, ciliate-margined; petals white, one and a half times as long as calyx; limb parted to two-thirds into linear lobes, with coronal scales reduced to a pair of

bosses; claw glabrous, not enlarged at summit; capsule oblong, 8 mm long and 4 mm broad; carpophore very slightly pubescent, 2 mm long; seeds triangular-reniform, to 1 mm long, bluntly tuberculate, flat on the back. May–August.

620 Pine woods, sandy sea banks, and meadows. — European part: Kar.-Lap., Lad.-Ilm., Dv.-Pech., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl. L. Don, L. V. (N. part); Caucasus: Cisc. **Gen.distr.:** Centr. Eur., Bal. (N. part). Described from Tatarin. Type in London.

37. *S. praemixta* M. Pop. in Opred. rast. okr. Tashkenta II (1924) 110 et in Bull. Univ. As. centr. IX, Suppl. (1925) 37. — *S. turkestanica* Rgl. et Schm. Pl. Fedtsch. (1882) 13, non Rgl. (1873). — Exs.: H. F. A. M. no. 122.

Perennial; stems several to numerous, 20–50 cm long, very slightly ascending at base, then erect, scaberulous in lower part; radical leaves spatulate or lanceolate, 5–8 cm long and 0.5–1 cm broad, acuminate, long-petioled, with ciliolate margin; cauline leaves shorter and narrower, with axillary fascicles; flowers in a long raceme; pedicels 8–12 mm long; bracts lance-subulate, broadly scarious-margined at base; calyx cylindric-clavate, 10 mm long and 2 mm broad, scarious-margined, glabrous, the teeth ciliate; petals buff, with dark longitudinal stripes, one and a half times as long as calyx; limb 2-parted nearly to base, without coronal scales; claw glabrous; capsule ovoid, 6–9 mm long; carpophore pubescent, 2.5–3 mm long; seeds reniform, finely striate. May–June.

Loess hills, southern slopes, and semideserts. — Centr. Asia: Syr D., Balkh. (S.), T. Sh. (foothills). Endemic. Described from Karakskaya steppe. Type in Leningrad.

38. *S. dagestanica* Rupr. Fl. Cauc. (1869) 194; Grossg., Fl. Kavk. II, 409. — *S. saxatilis* δ *dagestanica* Boiss. Suppl. (1888) 103; Williams in Journ. of Linn. Soc. XXXII (1896) 166.

623 Perennial, woody at base; stems numerous, erect, herbaceous, up to 15–35 cm long, densely retrorse-hairy up to the middle, glabrous above; leaves spatulate-lanceolate, undulate-margined, 1 cm long and 4–5 mm broad, tapering to a short broad petiole, attenuate at apex to a short reflexed tip, glabrous above, hispid on the veins beneath and on the margin; leaves of axillary fascicles smaller, recurved; inflorescence a panicle with few 1–3-flowered branches; bracts small, herbaceous; flowers nodding, the petiole shorter to longer than calyx; calyx campanulate, 8–9 mm long and 3 mm broad, glabrous, the acutish teeth with scarious ciliate margin; petals greenish, one and a half times as long as calyx; limb parted nearly to base into obovate lobes; coronal scales ovate, acutish, to 1 mm long; claw auriculate and ciliate at summit; filaments glabrous or in lower part very sparsely hairy; capsule ovoid, 7–9 mm long and 4 mm broad; carpophore hairy, 2 mm long; seeds rounded-reniform, 1.5 mm long, minutely and bluntly tuberculate. June–July. (Plate XXXVII, Figure 4).

Rocks and pebbly banks of mountain streams, at altitudes between 1,500 and 2,000 m. — Caucasus: Dag., E. Transc.: Kubeno Pass near Khinalug. Endemic. Described from Daghestan (Bezhit River). Type in Leningrad.



PLATE XXXVII. 1. *Silene procumbens* Murr. - 2. *S. siberica* M.B.: flower. - 3. *S. anglica* L.: flower. - 4. *S. dagestanica* Rupr.: flower, leaf. - 5. *S. dichotoma* Ehrh.: flower.

39. *S. chloropetala* Rupr. Fl. Caucasi (1869) 195; Grossg., Fl. Kavk. II, 409. — *S. longipetala* Boiss. Fl. Or. Suppl., 103, non Vent.; Williams, Journ. of Linn. Soc. XXXII (1896) 165 quo ad pl. cauc., non Vent.

Perennial; stems several, 30–100 cm long, knotted and puberulent at base, glabrous and viscid above; leaves elliptic-lanceolate, tapering to a rather long petiole, together with it 4–7 cm long, 1.0–1.7 cm broad, short-hairy, with axillary fascicles of linear leaves; panicle loose, with slender subpatulous 3–7-flowered branches; bracts small, herbaceous, with scarious ciliate margin; pedicels 0.7–3 cm long, glabrous or in lower part sparsely and inconspicuously hairy; calyx glabrous, 8–9 mm long and 2.5–3.5 mm broad, the obtuse teeth with scarious ciliate margin; petals yellowish-green, about twice as long as calyx; limb parted nearly to base into oblong lobes, with coronal scales 0.5 mm long, the glabrous claw auriculate at summit; filaments glabrous; capsule ovoid, 10 mm long and 5 mm broad; carpophore glabrous or very slightly scaberulous, 3 mm long. June–July.

Dry stony slopes, at altitudes between 1,100 and 1,500 m. — Caucasus: Dag. Endemic. Described from Daghestan, from the Avarsk Koi-Su River. Type in Leningrad.

40. *S. eremitica* Boiss. Fl. Or. I (1867) 644; Rohrb. Monogr. (1868) 223; Williams in Journ. of Linn. Soc. XXXII (1896) 182; Schischk. in Trav. du Mus. de Georgie I, 15. — *S. salsuginosa* Fom. in Acta Horti Tiflis. VI, 3 (1904) 34; Herb. viv. Suppl. I (1910) 175.

624 Perennial; stems branched from base, 30–60 cm long, scabrous, sometimes glabrous at summit; leaves lance-linear, 2–3 cm long and 0.3–0.8 cm broad, sharply scabrous on the margin, 1-veined, with axillary fascicles of shorter and narrower leaves; flowers solitary at tips of stems and branches; pedicels shorter to longer than calyx, erect or nodding, commonly glutinous; bracts lanceolate, acute ca. 2 mm long; calyx cylindric, 10–12 mm long, glabrous, with obtuse scarious-margined teeth; petals yellowish-green, about twice as long as calyx; limb lobed to one-third into oblong lobes; coronal scales none or reduced to a pair of bosses; claw not enlarged at summit; capsule ovoid, 11 mm long and 4 mm broad; carpophore smooth, 3 mm long. July–August.

Dry stony and solonchak slopes. — Caucasus: S. Transc.: Araks River at Iranian border (Karchevan, Bezoglybak). Gen. distr.: N. Iran, Turkish Armenia (between the villages of Kulp and Pirno). Described from N. Iran (between Khoi and Seidkodzhi). Type in Geneva; cotype in Leningrad.

41. *S. macrostyla* Maxim. Prim. Fl. Amur. (1859) 54; Rohrb. Monogr. 185; Kom., Fl. Mansh. II, 193. — *S. foliosa* β *macrostyla* Rohrb. in Linnaea XXXVI (1870) 683. — *S. tatarica* γ *willfordi* Rgl. in Bull. Soc. Nat. Mosc. (1862) 314. — *S. tatarica* δ *macrostyla* Rgl., l. c., (1862) 314.

Perennial; stems 1–3, with numerous sterile shoots at base, simple or branched at summit, glabrous or in lower part slightly pubescent, 50–70 cm long; leaves lanceolate, 3–8 cm long and 0.4–2 cm broad, acute, narrowing toward base, ciliate-margined, with axillary fascicles of narrower leaves; bracts linear, with scarious ciliate margin; pedicels about equaling calyx; cymes axillary and terminal, forming a racemiform panicle; calyx broadly campanulate, 6–7 mm long, glabrous; teeth triangular, acutish, with scarious

ciliate margin; petals white, twice as long as calyx, cuneate; limb lobed to one-third, the lobes oblong-lanceolate, without coronal scales; claw and filaments glabrous; style one and a half to two and a half times length of calyx; capsule ovoid, 5–9 mm long; carpophore 1.5–2 mm long; seeds grooved on the back. July—beginning of September.

Dry turfey slopes with stony or sandy soil. — Far East: Ze.-Bu., Uss. **Gen. distr.:** Manchuria, N. Korea. Described from the Ussuri River valley (environs of Nora and Atsa). Type in Leningrad.

42. *S. koreana* Kom., in A. H. P. XVIII (1901) 440; Fl. Mansh. II, 198. — Ic.: Kom., Fl. Mansh. II, tab. III.

Annual or biennial; stem erect, 20–70 cm long, sparsely scabrous-puberulent, viscid; radical leaves marcescent; cauline ovate or lance-linear, 2–6 cm long and 2–15 mm broad, long-petioled, with axillary fascicles; inflorescence a racemiform panicle, with viscid branches; pedicels ca. 10 mm long; bracts lanceolate; calyx cylindric-clavate, 7–9(10) mm long and 2 mm broad, glabrous, with obtusish scarious-margined teeth; petals whitish, one and a half times as long as calyx; limb deeply notched, without coronal scales; claw glabrous as are filaments; capsule ovoid, 8 mm long; carpophore pubescent, 2 mm long; seeds striate, 0.75 mm long. July–August.

Open oak and pine woods, on stony slopes. — Far East: Uda (Amgun stream), Uss. **Gen. distr.:** N. Korea. Described from North Korea (Tsatam-Ien). Type in Leningrad.

43. *S. foliosa* Maxim. Prim. Fl. Amur (1859) 53; Kom., Fl. Mansh. II, 193. — *S. foliosa* α *typica* Rohrb. Monogr. Sil. (1868) 185. — *S. tatarica* β *foliosa* Rgl. Fl. Ussur. (1861) 27.

Perennial; stems numerous, slender, 40–50 cm long, simple, densely leafy, scabrous-puberulent; leaves lance-linear, 2–3 cm long and 3–6 mm broad, acute, scabrous on the margin and on the midrib, with axillary fascicles; inflorescence a dense racemiform panicle; pedicels ca. 5 mm long; bracts linear-lanceolate to linear; calyx cylindric-clavate, 6–7 mm long and 2–2.5 mm broad, glabrous, with short obtuse scarious-margined ciliate teeth; petals white, one and a half times as long as calyx; limb deeply cleft into linear lobes; coronal scales reduced to bosses; capsule ovoid, 6 mm long; carpophore 2 mm long; seeds reniform, tuberculate. July–August.

Rock crevices, seashores and banks of big rivers, and coastal sands. — Far East: Uss. **Gen. distr.:** Iezo Island, N. Korea? Described from the lower reaches of the Amur (near Pirserg and Sis). Type in Leningrad.

Series 3. *Graminifoliae* Schischk. — Calyx usually scarcely inflated; axillary fascicles none; leaves linear or linear-lanceolate.

44. *S. graminifolia* Otth in DC. Prodr. I (1824) 368; Ldb. Fl. Ross. I, 307; Kryl., Fl. Alt., 1058. — *S. stylosa* Bge. in Ldb. Fl. Alt. II (1830) 144. — *S. tenuis* Bge. Supplem. alt. 31; Rohrb. Monogr. Silene L. 186, non Willd. — Ic.: Ldb. Ic. pl. Fl. Ross. II, t. 138.

Perennial; taproot stout, giving rise to numerous sterile leafy shoots and flowering stems, these erect, simple, glabrous or puberulent at base, sometimes viscid above, 10–40 cm long; radical leaves lance-linear, 2–8 cm long and 1–4.5 mm broad, acute, scabrous-margined, ciliate at base, the petiole about as long as blade; cauline leaves similar, 1 or 2(3) pairs, sessile; inflorescence a raceme; pedicels slender, glabrous, shorter than to equaling calyx; bracts ovate, acuminate, scarious ciliate-margined; calyx campanulate, 6–10 mm long and 3–4 mm broad, glabrous, with triangular obtuse teeth; petals whitish or rarely roseate; limb cleft to the middle into oblong lobes, without coronal scales; claw auriculate and ciliate at summit; capsule oblong-ovoid; carpophore short or long. June–July.

Rocks and stony slopes in the alpine zone and at middle altitudes. — W. Siberia: Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen.distr.**: N.Mong., Dzu.-Kash., Him. Described from Altai. Type in Geneva.

Note. The specimen of *Silene tenuis* Willd. that I saw in the Willdenow Herbarium does not correspond to the Siberian plant and belongs to some other species.

45. *S. chamarensis* Turcz. Fl. Baic.-dahur. I (1842) 207; Kryl., Fl. Zap. Sib. V, 1059. — *S. graminifolia* Ldb. Fl. Ross. I, 307, ex parte; Kryl., Fl. Alt. 143, partim. — *Viscaria intermedia* Ldb. Fl. Ross. I (1842) 329.

Perennial; taproot stout, giving rise to short densely leafy shoots and several flowering stems, these erect, simple, glabrous, 15–30 cm long; leaves of sterile shoots lanceolate to lance-linear, 3–7 cm long and 2–6 mm broad, short-acuminate, very slightly scaberulous on the margin, ciliolate at base, the petiole about as long as blade; cauline leaves narrower; inflorescence racemose; flowers nodding; pedicels much shorter than or rarely equaling calyx; bracts ovate, scarious-margined, ciliolate at base, acuminate; calyx more or less inflated, smooth, 10–15 mm long and 4–6 mm broad, with 10 dark nerves, the ovate obtuse broadly scarious-margined teeth to 2–2.5 mm long; petals white; limb cleft to the middle into oblong lobes, with small coronal scales; claw much enlarged at summit, with sparsely ciliate margin. July–August. (Plate XXXVIII, Figure 1).

Stony slopes and rocks in the alpine zone. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau., Lena-Kol. Endemic. Described from Khamar-Daban. Type in Leningrad.

46. *S. paucifolia* Ldb. Fl. Ross. I (1842) 304; Rupr. in Beitr. zur Pflanzenkunde Russ. Reich. VII (1850) 26. — *S. tenuis* c. *paucifolia* Rohrb. Monogr. *Silene* (1868) 187, ex parte; Williams, Revisio *Silene*, 143. — *S. graminifolia* ϵ *paucifolia* Rgl. et Tiling, Fl. ajan. (1859) 66. — *S. tenuis* var. *ruprechtiana* Trautv. in A. H. P. V. (1877) 30. — *S. chamarensis* var. *paucifolia* Kryl. Fl. Sib. occid. V (1931) 1059.

627 Perennial, taproot rather stout, multicapital, giving rise to abbreviated densely leafy shoots and erect flowering stems 5–15 cm long; leaves of sterile shoots narrowly spatulate or lance-linear, 2–5 cm long and 2–4 mm broad, obtusish to subacuminate, gradually tapering to a ciliolate petiole

the length of blade; cauline leaves 1 or 2 pairs, resembling the radical; inflorescence a short raceme; flowers erect or deflexed; pedicels glabrous, shorter than calyx; bracts ovate, broadly scarious-margined, ciliate, long-acuminate; calyx more or less inflated, smooth, 7–9 mm long and 4–6 mm broad; teeth ovate, obtuse, broadly scarious-margined; petals whitish; limb cleft to the middle or below into oblong lobes; coronal scales none; claw enlarged at summit. July–August.

Stony slopes and rocks. — Arctic: Arc. Eur., Arc. Sib. Endemic. Described from Arctic Siberia without location record. Type in Berlin.

47. *S. stenophylla* Ldb. Fl. Ross. I (1842) 36. — *S. tenuis* c. *paucifolia* Rohrb. Monogr. Silene (1868) 187, ex parte. — *S. graminifolia* var. *stenophylla* Trautv. Fl. terrae Tschuktschorum (1868) 14.

Perennial, densely matted; stems numerous, erect, 5–22 cm long, simple, glabrous; radical leaves numerous, oblong-linear, long-petioled, 1.5 cm long including petiole, 1–2 mm broad, sparingly ciliate; cauline leaves similar but smaller, at base dilated and connate in pairs; flowers in a racemose inflorescence or solitary at tips of stems; pedicels 10–15 mm long; bracts herbaceous, abruptly attenuate from a broad base, ciliate; calyx inflated, 10–15 mm long and 5–9 mm broad, glabrous, with broadly triangular obtuse or acutish teeth; petals light pink, one and a half times as long as calyx; limb cleft to below the middle into obovate lobes; coronal scales none; capsule ovoid, 9–10 mm long; carpophore pubescent, 3–4 mm long; seeds reniform, striate, ca. 1.5 mm long. July–August. (Plate XXXVIII, Figure 2).

Stony slopes, coastal cliffs, and sandy seashores. — Arctic: Arc. Sib., Chuk., An.; E. Siberia: Lena-Kol.; Far East: Ze.-Bu., Okh., Sakh. **Gen. distr.:** Ber., Arc. Am. Described from Arctic Siberia. Type in Leningrad; cotype in Berlin.

48. *S. jensisseensis* Willd. Enum. pl. Hort. Berol. (1809) 154. — *S. jensissea* Poir. Encycl. Suppl. V (1817) 154; Turcz. Fl. baic.-dahur. I, 203. — *S. graminifolia* Ldb. Fl. Ross. I, 308, part. — *S. ambigua* Turcz., l. c., (1842) 205. — *S. dasphylla* Turcz., l. c., (1842) 206. — *S. tenuis* b. *jensissea* Rohrb. Monogr. Silene (1868) 187. — ? *S. tenuifolia* Oth in DC. Prodr. I (1824) 379; Ldb., l. c., 320. — Exs.: HFR no. 2978, 2979.

628

Perennial; taproot stout; abbreviated sterile shoots numerous; flowers stems several, ascending at base, then erect or somewhat recurved, 15–60 cm long, simple, glabrous, or in lower part scabrous-pubescent; leaves of sterile shoots lance-linear, acute, long-petioled, 10–11 cm long including petiole, 0.3–6 mm broad, glabrous, the margin ciliate and velvety-puberulent; cauline leaves usually shorter and narrower, greatly exceeded by the internodes, commonly glabrous; flowers erect, in a raceme or narrow panicle; pedicels 4–14 mm long, glabrous; bracts lanceolate from ovate base, long-acuminate, the membranous margin densely crisp-ciliate; calyx glabrous, oblong, sometimes inflated, (6)7–15(18) mm long, 3–7 mm broad, with rather long acute or acutish teeth; petals white, very rarely purplish-violet, slightly exceeding to one and a half times as long as calyx; limb cleft to below the middle into oblong-linear lobes, with coronal scales; claw glabrous as are filaments; capsule ovoid; carpophore, short, pubescent; seeds reniform, ca. 1 mm long, striate. June–August. (Plate XXXVIII, Figure 4).

The plant varies widely in all its parts. The following forms occur:
f. vulgaris (Turcz.) Schischk. Stems 40–60 cm long; radical leaves glabrous, 8–11 cm long and 2–3 mm broad; calyx 8–12 mm long.

f. latifolia (Turcz.) Schischk. Resembling the preceding, but leaves 4–6 mm broad.

f. ambigua (Turcz.) Schischk. Stems 25–30 cm long; leaves glabrous, 1/3–1 mm broad, erect; calyx 8–12 mm long.

f. setifolia (Turcz.) Schischk. Stems 13–16 cm long; leaves 2–3 cm long and 1/3–2/3(1) mm broad, glabrous, recurved; calyx 7–8(10) mm long.

f. parviflora (Turcz.) Schischk. Stems and leaves as in *f. vulgaris*, but calyx 6–7 mm long.

f. dasphylla (Turcz.) Schischk. Leaves setaceous, 1/3–2/3 mm broad, velutinous; calyx 8–12 mm long.

f. puberula Schischk. Leaves pubescent as in the preceding form, but 1–3 mm broad.

f. purpurea Schischk. Petals violet-tinged.

Exposed southern slopes, steppes, open woods, sandy and sandy-pebbly soils. — W. Siberia: E. Alt. (Sailyugem); E. Siberia: Ang.-Say., Dau.; Far East: Ze.-Bu., Uss. **Gen. distr.:** Mong. Described from the Yenisei River basin. Type in Berlin.

Section 5. **NANOSILENE** Otth. in DC. Prodr. I (1824), 367 sens. lat. — Plants forming low mats; calyx glabrous, campanulate, 4–6 mm long; petals commonly pink, notched or subentire; carpophore 1–2 mm long. Arcto-alpine plants.

629 49. *S. acaulis* L. Sp. pl. ed. 2 (1762) 603; Ldb. Fl. Ross. I, 303; Rohrb. Monogr. 143; Williams in Journ. of Linn. Soc. XXXII (1896) 101; Kryl., Fl. Zap. Sib. V, 1655. — *Cucubalus acaulis* L. Sp. pl. (1753) 415. — *Lychnis acaulis* Scop. Fl. carn. I (1772) 307. — *Cucubalus muscosus* Lam. Fl. Fr. III (1778) 309. — *Silene caespitosa* Salisb. Prodr. (1796) 302, nom. nud., non Stev. — *S. norvegica* Pers. Syn. I (1805) 500. — *S. excapa* All. Fl. pedem. II (1785) 83. — *S. bryoides* Jord. Obs. V (1847) 35, t. 1. — Ic.: Hegi, Ill. Fl. III, t. 99, f. 1; Perfil'ev, Mater. k flore ostrovov Nov. Zemli i Kolgueva, Fig. 6 (photograph).

Perennial, forming dense depressed or pulvinate mats 5–13 cm high and 10–45 cm in diameter; stem densely branched; branches numerous, densely subimbricately leafy; flowering stems 3–4 cm long, glabrous, densely leafy, closely covered at base with remnants of dead leaves; leaves linear to linear-lanceolate, 4–12 mm long and 0.3–1.5 mm broad, acute, sessile, coaetaneous, glabrous, the margins ciliate in lower half; flowers solitary, subsessile (var. *excapa* (All.) DC.) or pedicellate, the glabrous pedicels 5–15 mm long, with a pair of bracteoles; plants sometimes dioecious; calyx campanulate, 4–6 mm long and 3–4 mm broad, often purple-tinged, glabrous, with broadly triangular obtuse ciliate teeth; petals dark rose, more rarely white (var. *alba* Otth), twice as long as calyx; limb obovate, notched or subentire; coronal scales very short or reduced to bosses; claw glabrous; capsule oblong-ovaloid, 7 mm long and 2.5 mm broad; carpophore glabrous, 1 mm long; seeds rounded-reniform, punctate, slightly grooved on the back. June–July.

Tundras and alpine zone. — Arctic: Nov. Z., Arc. Eur., Arc. Sib. (Tobol, north), Chuk., An.; European part: Kar.-Lap., N. Ural; Far East: Kamch., Komandorskie (Commander) Islands. **Gen. distr.:** mountains of N., Centr., and S. Eur., Spitzbergen, Greenland, Labrador, Arc. Am., Rocky Mountains. Described from the mountains of Lapland, Switzerland, and N. England. Type in London.

50. *S. dianthoides* Pers. Syn. pl. I (1805) 500; Boiss. Fl. Or. I (1867) 610; Rohrb. Monogr. (1868) 197; Williams in Journ. of Linn. Soc. XXXII (1896) 153. — *S. melanophylla* Boiss. Diagn. Ser. I, 1 (1842) 24.

630 Perennial; stems in tufts of several, 7–16 cm long, puberulent in lower part (var. *typica* Trautv.) or glabrate (var. *glabrata* Trautv.), sometimes viscid at summit; radical leaves numerous, linear, 8–16 mm long and 1–2 mm broad, puberulent or glabrate; cauline leaves 2–4 pairs, shorter; flowers 3–10 per stem, borne on short upright branchlets and forming a compact subcapitate inflorescence; bracts triangular-lanceolate, ca. 1.5 mm long, herbaceous, scarious-margined, the lowermost pair larger; calyx campanulate, 4–6 mm long, glabrous or puberulent; teeth rounded, scarious-margined; petals pink or white, one and a half times as long as calyx; limb cleft to the middle into linear-oblong lobes; coronal scales none or reduced to bosses; claw glabrous; capsule ovoid, 5 mm long and 2.5 mm broad; carpophore 0.5–1.5 mm long; seeds finely wrinkled, to 1 1/2 mm long, shallowly grooved on the back. June–August. (Plate XXXVIII, Figure 3).

Dry and stony slopes in the alpine zone, at altitudes between 2,100 and 3,400 m. — Caucasus: E. and S. Transc. **Gen. distr.:** As. Min., Arm.-Kurd. Described from the Orient. Type in Paris.

51. *S. marcowiczii* Schischk. in Bull. Mus. de Géorgie I (1920–22) 11; Grossg., Fl. Kavk. II, 405. — Ic.: Schischk., l. c., tab. III, fig. 1–2.

Perennial, tufted; stems glabrous as are the leaves, 10–15 cm long, clothed at base with remnants of dead leaves; radical leaves linear or spatulate-linear, 2 cm long and 0.5–1.5 mm broad; cauline leaves 3 or 4 pairs, smaller; flowers 1–4, terminal, subsessile or on pedicels up to twice the length of calyx; bracts herbaceous, lanceolate, acuminate, scarious-margined, glabrous, inserted just below the flower; calyx campanulate, 4–5 mm long and 3 mm broad, glabrous, often purple-tinged, with obtuse scarious-margined teeth; petals pink or whitish, one and a half times as long as calyx; limb lobed to one-fourth or very slightly notched, without coronal scales, gradually tapering to a glabrous claw; capsule ovoid, ca. 5 mm long and 3 mm broad; carpophore glabrous, 1 mm long, seeds finely and bluntly tuberculate, reniform, ca. 1 mm long, grooved on the back. End of June – August.

Rocks and stony slopes in the alpine zone, at altitudes between 2,500 and 3,000 m. — Caucasus: Gr. Cauc. (W. part). Endemic. Described from Mamison mountain pass. Type in Tbilisi (Tiflis); cotype in Leningrad.

52. *S. rupestris* L. Sp. pl. (1753) 421; Ldb. Fl. Ross. I, 316; Kryl., Fl. Zap. Sib. V, 1056. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 288. — Exs.: HFR no. 2653; Pl. Finl. exs. no. 610.

Perennial, glabrous throughout; stem 7–15 cm long, branched from base, more rarely simple; leaves ovate-lanceolate to lanceolate, acute, 1–2 cm long and 2–6 mm broad; flowers in a loose subcorymbose terminal inflorescence; pedicels 6–20 mm long; calyx campanulate, 4–5 mm long and 2–2.5 mm broad, glabrous, with ovate-obtuse teeth; petals white or pink, one and a half times as long as calyx, deeply notched, with lanceolate acuminate coronal scales; claw glabrous as are filaments; capsule ovoid, ca. 4 mm long and 2 mm broad; carpophore glabrous, 1.5–2 mm long. July–August.

631 Rocks and sandy pine woods. — European part: reported for Ural (Verkhotyriya). Gen. distr.: mountains of Centr. and S. Eur., Scand., Lapland, and Finland. Described from the mountains of Sweden and Switzerland. Type in London.

Section 6. LASIOSTEMONES Boiss. Fl. Or. I (1867) 574, 635. — Flowers perfect, often initially nodding; calyx commonly glabrous; filaments hairy or densely ciliate; inflorescence paniculate or racemose.

Series 1. *Racemosae* Schischk. — Inflorescence racemose; axillary fascicles wanting.

53. *S. ruprechtii* Schischk, in A. Grossh. D. Sosnow. et B. Schischk. Fl. Tiflisiensis (1925) 204. — *S. saxatilis* M. B. Fl. taur.-cauc. I (1808) 338, non Sims, Bot. Mag. 18 (1803), tab. 689; Ldb. Fl. Ross. I, 318; Boiss. Fl. Or. I, 635; Suppl. 103; Rohrb. Monogr. 212; Ruprecht, Fl. Cauc. 191; Shmal'g., Fl. I, 139; Williams in Journ. of Linn. Soc. XXXII (1896). 166. — Ic.: A. Grossh., D. Sosnow. et B. Schischk. op. cit. fig. no. 83.

Perennial, forming small mats; stems erect, often sparsely pubescent in lower part, glabrous above, viscous; branched in inflorescence, 15–70 cm long; leaves lance-linear, 5–7 cm long and 4–5 mm broad, 1-veined, acute, tapering at base to a ciliate petiole, the upper sessile and narrowly linear; flowers in a loose few-flowered inflorescence, often 1-sidedly nodding; pedicels glabrous, filiform, equaling or exceeding calyx; bracts ovate, acute, ciliate, often purple-tinged; calyx narrowly campanulate, 7.5–9 mm long and 3 mm broad, glabrous, with lanceolate acutish scarious-margined ciliate teeth; petals white, greenish or reddish on the outside, twice as long as calyx; limb parted nearly to base into oblong-lanceolate lobes; coronal scales lance-linear, acutish; claw auriculate at summit, ciliate; stamens villous; capsule ovoid, 6–9 mm long and 3.5 mm broad; carpophore pubescent, 2–5 mm long; seeds brown, reniform, 1.25 mm in diameter, grooved on the back, tuberculate. June–August.

A very variable plant. The following varieties may be noted: 1) var. *pumila* Schischk. — stems 4–10 cm long, 1–3-flowered; leaves short, 2–4 mm broad; calyx 4.5 mm long; petal limb subentire. 2) var. *congesta* Boiss. — stems scarcely branched; flowers short-pedicel, in cymes of 1 or 2. 3) var. *stenophylla* Som. et Lev. — stems to 60 cm long, puberulent in lower part; leaves linear; petals lurid.

Stony slopes and rocks in the alpine and subalpine zones, and glacial moraines. — Caucasus: Cisc., Main Range, Dag., W., E., and S. Transc., Tal. Gen. distr.: Arm.-Kurd., Lazistan, N. Iran. Described from the vicinity of Tbilisi (Tiflis). Type in Tbilisi.

632 Note. The specific name *S. saxatilis*, adopted by earlier authorities such as M. Bieberstein, Ledebour, Boissier, and others, cannot be retained since Sims, in 1803, described a Siberian plant under this appellation and it is known that the Caucasian plant does not grow in Siberia. For this reason we suggested already in 1923, in *Fl. Tiflisiensis* (l. c.), a new name for this plant. Ruprecht (l. c.), was first to draw attention to the problem, but he did not suggest any name for the Caucasian plant and he credited authorship to Bieberstein, instead of Sims, in contravention to rules of nomenclature. Ruprecht pointed out the great variability of the plant and described a large number of varieties but, unfortunately, did not give them names.

54. *S. lasiantha* C. Koch in *Linnaea* XV (1841) 712; Ldb. *Fl. Ross.* I, 778. — *S. olympica* var. *pubescens* Boiss. *Fl. Or.* I (1867) 610; Williams in *Journ. of Linn. Soc.* XXXII (1896) 154. — *S. marschalli* var. *lasiantha* Rupr. *Fl. Cauc.* (1869) 195. — *S. asperifolia* Freyn in *Bull. Herb. Boiss.* III (1895) 83; Grossg., *Fl. Kavk.* II, 408. — *S. longipetala* var. *asperifolia* Williams, l. c., (1896) 165. — *S. olympica* var. *stenophylla* Trautv. in *A. H. P.* IV (1876) 354, non Boiss.; VII, 2 (1880) 420; VIII, 1 (1883) 139.

Perennial; stems solitary or several, erect, 15–30 cm long, puberulent or sharply scabrous in lower part, glabrous and viscid above; radical leaves lanceolate, to 7 cm long and 2.5–3.5 cm broad, sharply scabrous or sometimes glabrate, 1-veined; cauline leaves smaller, without axillary fascicles; inflorescence a contracted racemiform panicle, with short-1–3-flowered branches; pedicels filiform, erect, glabrous, equaling or much shorter than calyx; calyx campanulate, 6–9.5 mm long, glabrous, sometimes violet-tinged, with obtuse ciliolate teeth; petals one and a half times to twice as long as calyx, greenish-yellow; limb cleft to below the middle; coronal scales none or reduced to bosses; claw auriculate and ciliate at summit; filaments densely hairy; capsule ovoid, 10 mm long and 5 mm broad; carpophore glabrous, 2–3 mm long. June–July. (Plate XXXVIII, Figure 5).

Turfy and stony slopes in the subalpine and alpine zones. — Caucasus: E. and S. Transc., Tal. (Kyz-Iordy). Gen. distr.: Arm.-Kurd., As. Min., Iran. (Savalan). Described from Alagez (village of Ashtarak). Type in Berlin.

635 Series 2. *Paniculatae* Schischk. — Flowers in a loose panicle; axillary fascicles present.

55. *S. marschallii* C. A. M. *Verzeichn. Pfl. Cauc.* (1831) 214; Boiss. *Fl. Or.* I, 635; Rohrb. *Monogr.*, 214; Williams in *Journ. of Linn. Soc.* XXXII (1896) 166, excl. syn. et var. — *Cucubalus mollissimus* M. B. *Fl. taur.-cauc.* I (1808) 324; III (1819) 304, non L.

Perennial; stem 40–80 cm long, puberulent up to the middle, glabrous above, viscid; lower leaves lance-linear, 5–8 cm long and 1–4 mm broad, subacute, puberulent, revolute-margined, with a prominent midrib and



PLATE XXXVIII. 1. *Silene chamarensis* Turcz. — 2. *S. stenophylla* Ldb. — 3. *S. dianthoides* Pers. — 4. *S. jensseensis* Willd. — 5. *S. lasiantha* C. Koch.

2 obsolescent lateral veins; upper leaves smaller and commonly glabrous; fascicular leaves linear; flowers in a loose panicle, on opposite subpatulous branches; pedicels shorter than to equaling calyx, pubescent, nodding; bracts small, broadly scarious-margined, ciliate; calyx campanulate or broadly campanulate, 7–8 mm long and 3–5 mm broad, glabrous or very slightly pubescent, sometimes violet-tinged, with obtuse scarious-margined ciliate teeth; petals white, one and a half times to twice as long as calyx; limb cleft to the middle or lower down into linear lobes; coronal scales lanceolate, acutish; claw auriculate and ciliate at summit; filaments hairy; capsule ovoid, 7 mm long and 4 mm broad; carpophore pubescent, 1 1/2 mm long. End of April, May–June.

Dry stony slopes. — Caucasus: E. and S. Transc., Tal. **Gen. distr.:** Arm.-Kurd., Iran. Described from Talysh (Zyvant village). Type in Leningrad.

56. *S. propinqua* Schischk. in Bull. du Mus. de Géorgie I (1920–22) 14. — *S. puberula* Boiss. Fl. Or. I (1867) 636, non Bertol.; Schischk. in Ber. d. Tomsk. Staat. Univ. 80 (1929) 445; Grossg., Fl. Kavk. II, 407. — Ic.: Schischk. in Bull. du Mus. Géorg. tab. IV.

Perennial; stems solitary or several, 40–100 cm long, knotted, minutely puberulent or glabrous beneath, viscid above; leaves lanceolate to ovate-lanceolate, acute, 3–8 cm long and 0.5–1.5 cm broad, 1–3-veined, scabrous-pubescent, sometimes glabrate; axillary fascicles with narrower linear-lanceolate leaves, inflorescence paniculate; bracts small, scarious, the margins ciliate; pedicels scabrous or puberulent, 7–12 mm long; calyx tubular-campanulate, 8–11 mm long and 3 mm broad, glabrous or puberulent, with obtuse teeth; petals white, twice as long as calyx; limb parted nearly to base into oblong-linear lobes, with lanceolate acutish coronal scales; claw ciliate; filaments lanate; capsule ovoid, 10 mm long and 4–5 mm broad; carpophore hairy, 2.5–3.5 mm long; seeds triangular-reniform, 1–2 mm long, bluntly tuberculate. May–July.

Steppe and stony slopes; also pine woods. — Caucasus: E. and S. Transc. **Gen. distr.:** Arm.-Kurd. Described from E. Transc. (Boz-Dagh Range). Type in Tbilisi.

57. *S. gasimailikensis* B. Fedtsch. in Alg. Bot. Zeitschr. XIV (1908) 2; Consp. Fl. Turkest. II (1909) 121.

Perennial; stems ascending in lower part, then erect, 50–70 cm long, glabrous, branched in upper half; leaves oval-lanceolate, 6–8 cm long and 1.0–2.5 cm broad, the lower tapering to a short broad petiole, the upper subsessile, all acuminate, glabrous, ciliolate-margined; fascicular leaves small; flowers in a lax paniculate inflorescence; bracts scarious, long-acuminate from lanceolate base, the margin densely ciliate; pedicels 5–20 mm long; calyx cylindric-clavate, glabrous, 9–20 mm long, with short oval-triangular obtuse ciliate teeth; petals white; limb parted nearly to base; coronal scales none; claw beset with long soft cilia; filaments ciliate; capsule 8–10 mm long; carpophore 3–4 mm long; seeds angular-reniform, finely muricate, shallowly grooved on the back, the faces concave. April–June.

Stony slopes, often outcrops of red sandstone, at altitudes between 900 and 1,800 m; also among crops, as a weed. — Centr. Asia: Pam.-Al. Endemic. Described from Gazimailik Pass. Type in Leningrad.

Section 7. SCLEROCALYCINAE Boiss. Fl. Or. I (1867) 575, 683. — Flowers erect; calyx large, coriaceous, glabrous, in fruit clavate; carpophore long; petal-claw not toothed; commonly tall plants with a stout taproot.

Series 1. *Longiflorae* Schischk. — Calyx 16–35 mm long, usually with alternately obtuse and acute teeth; petals 2-cleft; filaments glabrous; leaves lanceolate.

58. *S. longiflora* Ehrh. Beitr. VII (1792) 144; Ldb. Fl. Ross. I, 324 part.; Boiss. Fl. Or. I, 639; Rohrb. Monogr. Sil. 178; Shmal'g., Fl. I, 140. — Ic.: Waldst. et Kit. Fl. rar. Hung. I, t. 8; Rchb. Ic. Fl. Germ. VI, tab. 294. — Exs.: Callier, It. taur. III, no. 554.

637 Perennial; stem erect, 36–60 cm long, glabrous, sometimes viscid at summit, branched or simple; lower leaves lanceolate, tapering to a rather long petiole, 3–8 cm long and 2–10 mm broad; pedicels one-third to half as long as calyx; bracts lance-subulate, apiculate, 6–7 mm long, narrowly scarious-margined; calyx 23–30 mm long, glabrous, with alternately obtuse and acute teeth; petals whitish; limb cleft to one-third or to the middle into oblong lobes; coronal scales oblong, 1/2–1 mm long; petal-claw and filaments glabrous; capsule ovoid, ca. 10 mm long; carpophore glabrous, the length of capsule; seeds triangular-reniform, finely striate, ca. 1.2 mm long. June–July.

Scrub, turf and stony slopes, and chernozem steppes. — European part: U.Dnp., Bl., Crim. **Gen.distr.:** Centr. Eur., N. part of the Balkan Peninsula. Described from Hungary.

59. *S. bupleuroides* L. Sp.pl. (1753) 421; Ldb. Fl. Ross. I, 324; Boiss. Fl. Or. I, 693; Rohrb. Monogr. Sil. 175; Freyn in Bull. Herb. Boiss. III (1895) 80; Williams in Journ. of Linn. Soc. XXXII (1896) 134. — *S. longiflora* Boiss. Fl. Or. I, 693, quo ad pl. cauc. — *S. viscariaefolia* Boiss. Diagn. Ser. 1, I (1842) 30; Trautv. Increm. 141.

Perennial, glaucescent, quite glabrous or scabrous only in lower part; stems erect, branched at summit, 40–80 cm long; lower leaves subsessile, 6–10 cm long and 0.5–1 cm broad, very slightly scabrous-margined; upper leaves smaller; inflorescence a panicle with upright branches; pedicels equaling or twice to thrice as long as calyx; bracts long-acuminate, narrowly scarious-margined, ciliate; calyx cylindric-clavate, 1.5–3 cm long, coriaceous, glabrous; teeth subequal, acute, scarious-margined, slightly ciliate; petals whitish, one and a half times as long as calyx; limb cleft to the middle or lower down into oblong-oval lobes; coronal scales linear-subulate, 2.0–2.5 mm long; claw auriculate at summit, glabrous; capsule ovoid, 1–1.1 cm long and 0.5 mm broad; carpophore glabrous or sparsely and minutely hairy, 6–10 mm long. June–July.

Exposed turf steppe slopes. — Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm., Pam.-Al. **Gen.distr.:** Arm.-Kurd., Iran. Described from Iran. Type in London.

60. *S. litwinowii* Schischk. in Acta Inst. Botan. Ac. Sc. URSS, Ser. 1, II (1936) 142. — *S. schimperiana* var. *latifolia* Litw. in Trav. Musée Botan. de l'Acad. Sc. de St. Pétersb. III (1907) 101.

Perennial; stems several, ascending at base, then erect, 50–90 cm long, glabrous, viscid at summit, branched; leaves lance-linear, 4–6 cm long and

5–10 mm broad, acuminate, narrowing toward base, glabrous; inflorescence a panicle; bracts long-acuminate, glabrous; calyx coriaceous, cylindric-clavate, 2.2–2.6 cm long, glabrous; teeth alternately obtuse, usually shorter, and acute, scarious-margined, ciliate; petals white, one and a half times as long as calyx; limb lobed to one-third into oblong lobes; coronal scales none; claw glabrous; capsule oblong, 1–1.3 cm long and 4 mm broad; carpophore glabrous, the length of capsule; seeds reniform-triangular. July–August.

638 Rocks and stony slopes. — Centr. Asia: Mtn. Turkm. (Daine-Su, Chuli, Dushak), Endemic. Described from Daine-Su. Type in Leningrad.

61. *S. tachtensis* Franch. in Ann. Sc. nat. Bot. XV (1883) 239. — *S. longicalycina* Kom. in Trud. SPb Obshch. Estestvoisp. (1896) 130, ex parte. — *S. hissarica* M. Pop., Pochv. eksp. v bass. rr. Syr-Dar'i i Amu-Dar'i, No. II (1916) 42. — Ic.: M. Pop. ibid. (1916), tab. no. 1.

Perennial, woody at base, profusely branched; flowering stems erect, 15–30 cm long, glabrous or in lower part scabrous, in upper part usually viscid; leaves lanceolate to linear-lanceolate, tapering toward base, acute, 1-veined, glabrous or minutely puberulent, 4–6 cm long and 2–6 mm broad, sometimes with axillary fascicles; bracts dilated and ciliate at base, tapering to a subulate point; flowers in a racemose inflorescence, more rarely solitary or 2 or 3, on pedicels 1–2 cm long; calyx tubular-clavate, glabrous, whitish or faintly colored, membranous, 15–25 mm long and 3 mm broad, with ovate obtuse ciliate-margined teeth; petals white; limb cleft to the middle into linear lobes, with very small acute coronal scales; claw glabrous, enlarged at summit; capsule oblong, 10 mm long; carpophore scarcely pubescent or glabrous, 10–12 mm long; seeds smooth, 1.5 mm long. May–July.

Rocks in the alpine zone. — Centr. Asia: Pam.-Al., W. T. Sh. Endemic. Described from Samarkand-Tau. Type in Paris.

62. *S. solenantha* Trautv. in A. H. P. VII, 2 (1880) 421; Boiss. Suppl. (1888) 105. — *S. longiflora* var. *junceae* Otth in DC. Prodr. I (1824) 382; Ldb. Fl. Ross. I, 324; Boiss. Fl. Or. I, 639. — *S. longiflora* var. *seidlitzii* Som. et Lev. in A. H. P. XVI (1900) 76. — Exs.: HFR no. 2858.

639 Perennial; stems several, glabrous, viscid in upper part, simple or branched, 30–80 cm long, with numerous leafy fascicles at base; leaves linear-lanceolate, 2–4 cm long and 1–4 mm broad, sharply scabrous on the midrib and on the margins, sometimes prickly-ciliate; calyx cylindric, 25–30 mm long and 3 mm broad, glabrous; teeth alternately acute and obtuse, broadly scarious-margined, ciliolate; petals yellowish-green, one and a half times as long as calyx; limb lobed to one-third; coronal scales lanceolate, acutish; claw enlarged and ciliate at summit; capsule ovoid, 10 mm long and 5 mm broad; carpophore ca. 13 mm long, crisp-pubescent in lower part, glabrous above; seeds rounded-reniform, grooved on the back, bluntly tuberculate, ca. 1.2 mm in diameter. May–June.

Rocks and stony slopes. — Caucasus: Dag., E. Transc. (Tbilisi). Endemic. Described from Daghestan (Shalbus). Type in Leningrad.

*63. *S. armena* Boiss. Diagn. ser. I, 1 (1842) 29; Boiss. Fl. Or. I, 643; Rohrb. Monogr., 180; Williams in Journ. of Linn. Soc. XXXII (1896) 139. — *S. filipes* Freyn et Sint. in Bull. Herb. Boiss. III (1895) 98; Williams, l. c., (1896) 98.

Perennial; stems several, erect, 20–60 cm long, branched, glabrous; leaves linear, 4–5 cm long and 1–2 mm broad, sometimes folded lengthwise, with ciliate or scabrous margins; radical leaves numerous, cauline 3–6 pairs; flowers commonly solitary at tips of stems and branches; pedicels filiform, erect, about as long as calyx; bracts herbaceous, linear, narrowly scarious-margined, ciliate; calyx glabrous, cylindric-clavate, 16–19 mm long and ca. 4 mm broad; teeth alternately obtuse and acute, the scarious margin ciliate; petals white, one and a half times as long as calyx; limb cleft to below the middle into oblong lobes; coronal scales minute, to 0.5 mm long, ovate; claw auriculate at summit, glabrous; capsule ovoid, 12 mm long and 4 mm broad; carpophore glabrous, 6–9 mm long. May–July.

Stony slopes. — Caucasus: S. Transc. within Turkish range (former Oltin district). **Gen. distr.:** Turkish Armenia, Kilikiya, Cappadocia. Described from Erzerum. Type in Geneva.

64. *S. longidens* Schischk. in Bull. Mus. de Géorgie I (1920–22) 16; Grossg., Fl. Kavk. II, 410. — Ic.: Schischk. op. c., tab. III.

Perennial; stem clothed at base with remnants of dead leaves, arising laterally from the radical rosette, 8–10 cm long, glabrous; radical leaves numerous, congested, linear, ca. 2 cm long and 1–1.5 mm broad, 1-veined, glabrous; cauline leaves 3–8 pairs; flowers 2 or 3, terminal, approximate, short-pedicled, often 1-sidedly nodding; bracts herbaceous, linear-lanceolate, 8–10 mm long, acute; calyx cylindric, 22–24 mm long, glabrous; teeth to 5 mm long, apiculate, commonly involute; petals reddish, one and a half times as long as calyx; limb cleft to one-third or to the middle into oblong lobes; coronal scales ovate, acutish, to 1 mm long. July.

Stony screes at altitudes of about 1,800 m. — Caucasus: E. Transc. Endemic. Described from Kubin mountain pass. Type in Tbilisi; cotype in Leningrad.

640 65. *S. tenella* C. A. M. Verzeichn. Pfl. Cauc. (1831) 266; Ldb. Fl. Ross. I, 316; Boiss. Fl. Or. I, 651; Rohrb. Monogr. 194; Williams in Journ. of Linn. Soc. XXXII (1896) 150. — *S. calyculata* C. Koch in Linnaea, XIX (1847) 56. — *S. sahendica* Boiss. et Buhse, Aufz. (1860) 38. *S. olympica* γ *stenophylla* Boiss. Fl. Or. I (1867) 610. — *S. olympica* γ *calyculata* Williams, l. c., (1896) 154.

Perennial; stems numerous, crowded, erect, sparsely velvety-pubescent, 15–30 cm long; leaves linear-subulate, 2–3 cm long and 1–2 mm broad, acute, velutinous, with revolute margins; flowers solitary to several, erect, on short upright pedicels; bracts ovate, broadly scarious-margined, acuminate; calyx 12–15 mm long, glabrous, with broadly triangular acutish teeth; petals white, one and a half times as long as calyx; limb parted to three-quarters into linear lobes; coronal scales toothlike, acutish; claw auriculate and fringed at summit, glabrous; filaments glabrous; capsule ovoid, 9–10 mm long and 5 mm broad; carpophore glabrous or pubescent, 2.5–5 mm long. May–June.

Rocks and mountain steppes, at altitudes between 1,400 and 2,400 m. — Caucasus: S. Transc., Tal. **Gen. distr.:** N. Iran. Described from Zuvant (Talysh). Type in Leningrad.

Series 2. *Chlorifoliae* Schischk. — Plants more or less glaucous; leaves oval-spatulate, tapering to a petiole; calyx teeth alternately obtuse and acute; filaments glabrous.

66. *S. chlorifolia* Sm. Ic. ined. I (1789) t. 13; Ldb. Fl. Ross. I, 323; Boiss. Fl. Or. I, 640; Rohrb. Monogr. Sil. 177 part.; Rupr. Fl. Cauc. 196; Williams in Journ. of Linn. Soc. XXXII (1896) 137. — Ic.: Sm., l. c., t. 13; Bot. Mag. XXI, t. 807. — Exs.: HFR no. 1313.

Perennial; stems several, erect, 25–70 cm long, glabrous, sparingly branched at summit; lower leaves oblong-spatulate, 3–4 cm long and 1–2 cm broad, long-petioled; upper leaves orbicular, ca. 3 cm long and 2.5 cm broad, abruptly pointed, sessile, cordately clasping; flowers solitary at tips of stems and branches; pedicels stout, equaling to several times as long as calyx; calyx clavate-cylindric, 3–3.5 cm long, glabrous; teeth alternately obtuse and acute, the scarious margin ciliate; petals white, one and a half times as long as calyx; limb cleft to one-third or to the middle; coronal scales lanceolate, obtusish, ca. 3 mm long; capsule 18 mm long and 7 mm broad; carpophore subglabrous, 7 mm long; seeds triangular-reniform, ca. 2 mm long. June–August.

Stony, often calcareous slopes, and screes. — Caucasus: Main Range, E. and S. Transc. **Gen. distr.:** As. Min., Arm.-Kurd., Iran. Described from Armenia. Type in London.

641

67. *S. swertiifolia* Boiss. Diagn. ser. I, 1 (1842) 32; Ej. Fl. Or. I (1867) 640.

Perennial; glaucous, glabrous, viscid in upper part; stems several, erect, 60–80 cm long, simple or branched; lower leaves oval-spatulate, 2–4 cm long and 0.5–1.5 cm broad, abruptly pointed, long-petioled, the margins naked; median leaves short-petioled, with narrower blade; upper leaves linear; flowers several at tips of stems and branches, more rarely solitary; pedicels 1–7.5 cm long; bracts lanceolate, long-acuminate, greenish or reddish; calyx cylindric-clavate, 2–3 cm long, coriaceous, glabrous; teeth alternately obtuse and acute, broadly scarious-margined; petals white, one-third longer than calyx; limb cleft to the middle into obovate lobes; coronal scales reduced to minute bosses; claw glabrous; capsule oblong, 1.2–2 cm long and 5–6 mm broad, as long as or half as long again as the glabrous carpophore; seeds 1.5 mm in diameter, grooved on the back, the faces finely striate. April–June.

Stony and sandy slopes. — Centr. Asia: Mtn. Turkm. **Gen. distr.:** As. Min., Iran. Described from Cappadocia and Iran (Demavend). Type in Geneva.

Series 3. *Laciniatae* (Boiss.) Schischk. — Subsect. *Laciniatae* Boiss. Fl. Or. I (1867) 575. — Petal limb regularly 4-fid or 2-lobed, with a tooth on each margin.

68. *S. odoratissima* Bge. in Ldb. Fl. Alt. II (1830) 148; Ldb. Fl. Ross. I (1842) 312; Rohrb. Monogr. Silene, 195; Kryl., Fl. Zap. Sib. V, 1061. — *S. radians* Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1842) 40; Ldb. Fl. Ross. I, 777. — Ic.: Ldb., Ic. pl. Fl. Ross. IV (1833) t. 396.

Perennial; stems branched, glabrous, 30–60 cm long; leaves lance-linear, 3–7 cm long and 2–5 (9) mm broad, ciliate-margined, acuminate, narrowing toward base; flowers in a racemiform inflorescence, nodding prior to

anthesis, with a faint fragrance resembling that of lily of the valley; bracts small, herbaceous, scarious-margined; pedicels equaling or shorter than calyx, viscid; calyx cylindric-clavate, 12–15 mm long, glabrous, with obtuse or obtusish scarious-margined teeth; petals white, slightly longer than calyx; limb dissected to the middle into 4 linear or linear-oblong segments, the lateral segments bifid or toothed; coronal scales none; capsule 8–10 mm long; carpophore puberulent, 5–6 mm long; seeds reniform, finely striate. June–August.

Hummocky sands and sandy plains. — Centr. Asia: Ar.-Casp., Balkh., Kara K., Kyz. K. Endemic. Described from environs of Zaisan Lake. Type in Leningrad.

69. *S. olgiana* B. Fedtsch. in O. et B. Fedtsch. Consp. Fl. Turkest. II (1909)
342 118. — *S. schmalhauseni* Schischk. in Sched. ad herb. Fl. URSS IX (1932)
96 in nota ad *S. olgae*. — *S. olgae* Rgl. et Schmalh. in A. P. Fedchenko, Puteshestvie v Turkestan, no. 18 (1882) 14, non Rohrb. (1870).

Perennial; stems branched, glabrous, 30–40 cm long, densely leafy; leaves broadly-lanceolate, 3–4 cm long and 6–15 mm broad, ciliate-margined, acute, narrowing toward base; flowers in a racemiform inflorescence; pedicels shorter than to equaling calyx; bracts herbaceous, with scarious ciliate margin; calyx cylindric-clavate, 15–18 mm long, glabrous, with obtuse or acutish scarious-margined teeth; petals white, one and a half times as long as calyx; limb dissected to the middle into 4 linear or linear-oblong segments; coronal scales none. May–July.

Hummocky sands. — Centr. Asia: Balkh., Kyz. K. Endemic. Described from Kyzyl-Kum. Type in Leningrad.

70. *S. anisoloba* Schrenk in Bull. Académie Sc. de Pétersb. IV, II (1844) 198; Rohrb. Monogr. *Silene*, 196. — *S. montbretiana* var. *anisoloba* Will. in Journ. Linn. Soc. XXXII (1896) 149.

Perennial with woody stock and numerous herbaceous stems, 30–50 cm long; flowering stems simple, scabrous in lower part or subglabrous; leaves linear to linear-lanceolate, 2–4 cm long and 0.5–2 mm broad, acute, 1-veined, hirsute or glabrous, ciliate only at base; inflorescence a raceme; bracts lanceolate, acuminate, ciliate; pedicels 5–20 mm long; calyx cylindric-clavate, 14–23 mm long, glabrous; teeth obtuse, broadly scarious-margined, ciliate; petals white, one and a half times as long as calyx; limb 2-fid, with lateral teeth; coronal scales minute; capsule oblong; carpophore glabrous or minutely puberulent. June–July.

Stony slopes and vicinity of rocks. — W. Siberia: Irt. (S. part); Centr. Asia: Ar.-Casp. (N. E.), Balkh. (N. W.). Endemic. Described from Ulu-Tau. Type in Leningrad.

Series 4. *Asiaticae* Schischk. — Calyx 10–15 mm long; axillary fascicles present.

71. *S. plurifolia* Schischk. in Acta Inst. Bot. Ac. Sc. URSS. Sér. I, II (1936) 142. — Ic.: l. c., fig. 3.

Perennial; taproot ca. 5 mm thick; stems numerous, ascending at base, branched, 40–60 cm long, glabrous or in lower part scabrous, more or less

viscid above; leaves lance-linear to narrowly lanceolate, 5–8 cm long and 4–8 mm broad, green, glabrous, with minutely ciliate margin, gradually attenuate toward base, acute; fascicular leaves narrower; flowers at tips of stems and branches, in few-flowered dichasia, more rarely solitary, forming a loose panicle; bracts lance-linear, somewhat dilated and ciliate at base; pedicels 5–15 mm long; calyx cylindric-clavate, 15–16 mm long, glabrous; teeth minute, triangular, obtusish; petals one and a half times as long as calyx; limb parted nearly to base into linear lobes, without coronal scales; claw ciliate in lower part; filaments glabrous or scarcely ciliate; capsule ovoid, 8–10 mm long; carpophore glabrate, 6–8 mm long; seeds reniform, ca. 2 mm long. Fr. beginning of June.

Stony slopes. — Centr. Asia: Mtn. Turkm. (Kugitang Range opposite the village of Kugitang). Endemic. Described from the location indicated. Type in Leningrad.

72. *S. baldshuanica* B. Fedtsch. in Allg. Bot. Zeitschr. XIV (1908) 1; O. et B. Fedtsch. Consp. Fl. Turkest. II (1909) 121. — *S. kulabensis* B. Fedtsch. in Allg. Bot. Zeitschr. XIV (1908) 2; O. et B. Fedtsch. Consp. Fl. Turkest. II (1909) 119. — *S. pugionifolia* M. Pop. Pochv. eksp. v bass. Syr -Dar'i i Amu-Dar'i, no. II (1916) 46. — Ic.: ibid.

Perennial, very slightly woody at base; stems 60–80 cm long, branched, usually scabrous-pubescent in lower part, glabrous and viscous above; leaves lance-ovate to lanceolate, 5–10 cm long and 0.6–2 cm broad, acute, short-petioled, the upper sessile, scabrous-puberulent or glabrate like the stem, with axillary fascicles; flowers in a loose panicle; pedicels glabrous, 0.2–2 cm long; bracts lanceolate, 3–5 mm long, scarious, with dark violet-tinged nerves on the back; calyx cylindric-clavate, 12–22 mm long and ca. 3 mm broad, glabrous; teeth short, broad-ovate, rounded at apex, the scarious margin ciliate; petals white, one and a half times as long as calyx; limb cleft to the middle or to three-quarters into linear-oblong lobes; coronal scales lanceolate or subulate, ca. 1 mm long; claw dilated and ciliate at summit; filaments ciliate; capsule ovoid, ca. 10 mm long; carpophore minutely puberulent, 5–8 mm long; seeds reniform, 1.5–2 mm long, striate. May–June.

Foothill plains and slopes. — Centr. Asia: Pam.-Al., W. T. Sh. Endemic. Described from Baldzhuan. Type in Leningrad.

Series 5. *Bucharicae* Schischk. — Filaments ciliate.

73. *S. bucharica* M. Pop., Pochv. eksp. v bass. rr. Syr -Dar'i i Amu-Dar'i, no. 2 (1916) 43.

Perennial, woody at base; stems numerous, erect, 30 cm long, glabrous or puberulent beneath, viscid above, sparingly branched; leaves oblong-lanceolate or ovate, 5–8 cm long and 1–3.5 cm broad, acuminate, initially puberulent, becoming glabrous, with toothed-ciliate margin, the lower and median petiolate, the upper subsessile; inflorescence a raceme with short opposite 1-flowered branches; pedicels about as long as calyx; calyx 25–35 mm long, glabrous, tubular-clavate; teeth alternately ovate obtuse and triangular acute, ciliate-margined; petals white; limb cleft to the middle into oblong obtuse lobes; coronal scales lanceolate, acute; claw ciliate in lower part, enlarged at summit; filaments ciliate. July.

Stony slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Gissar Range (Sakkakhan Pass and near Khakimi). Type in Leningrad.

74. *S. kudrjaschevii* Schischk. sp. nova in Addenda V, p. 676.

Perennial; taproot 5–6 mm thick, ascending, multicapital; stems several to many, erect or at base ascending, 20–35 cm long, branched in upper half, covered nearly to summit with short patulous hairs; leaves narrowly ovate, 2–4 cm long and 0.8–1 cm broad, acuminate, tapering at base to a broad petiole or the upper sessile, scabrous-puberulent, rarely glabrate; flowers solitary at tips of stems and branches; pedicels long, glabrous or scabrous-pubescent; bracts lance-linear, acuminate, ciliate; calyx cylindric, 20–25 mm long, glabrous, coriaceous, with alternately obtuse and acutish teeth; petals (dry) lurid or dark violet; limb 2-fid to one-third, with oblong lobes and ovate obtusish coronal scales; carpophore glabrous, 5 mm long. June.

Savin thickets. — Centr. Asia: Amu D. Endemic. Described from Ak-Tag Mountain, south of Guzar. Type in Leningrad.

75. *S. obtusidentata* B. Fedtsch. et M. Pop. in Pochv. eksp. v bass. rr. Syr-Dar'i i Amu-Dar'i, no. II (1916) 44. — Ic.: Ibid., tab. no. 2. — Exs.: H. F. A. M. no. 182.

645 Perennial; stems erect, 30–60 cm long, very slightly woody at base, puberulent in lower part, glabrous and viscous above; leaves puberulent, oblong-lanceolate, lanceolate, or linear, 2–5.5 cm long and 2–5 mm broad; inflorescence a raceme with elongated lower and short upper branches, more rarely stems 1–3-flowered; bracts subulate, ciliate at base; pedicels longer than calyx, erect; calyx tubular-campanulate, 12–22 mm long, glabrous, coriaceous; teeth obtuse or alternately obtuse and acutish, with broadly scarious ciliate margin; petals one and a half times as long as calyx, white; limb 2-cleft to the middle, with linear-oblong lobes; coronal scales small, lanceolate, acute; claw ciliate, enlarged at summit; filaments ciliate; capsule oblong, 10–15 mm long and 4 mm broad; carpophore 5–9 mm long; seeds reniform, grooved on the back, the faces not striate. May–June.

Dry argillaceous and stony slopes. — Centr. Asia: Pam.-Al., T. Sh. (W.), Syr D. Endemic. Described from Khazret-Ayub, Mogol-Tau, Zeravshan, Kshtut, and Pskem. Type in Leningrad.

76. *S. sarawschanica* Rgl. et Schmalh. in A. P. Fedchenko, Puteshestvie v Turkestan, no. 18 (1882) 14.

Perennial; taproot stout; root collar densely covered with long hairs; stems ascending at base or erect, 10–40 cm long, glabrous or in lower part covered with short retrorse hairs, viscid above, usually with long slender branches; radical leaves lanceolate to lance-linear, 4–6 cm long and 5–7 mm broad, acute, gradually tapering to a long petiole; cauline leaves linear 1–3 mm broad, glabrous or scaberulous, with ciliate margins; flowers in racemose inflorescences at tips of stems and branches; bracts ovate, acuminate, densely ciliate; pedicels 1–2 cm long; calyx cylindric-clavate, 13–17 mm long, glabrous; teeth triangular-lanceolate, scarious-margined, obtuse, ciliate; petals white, one and a half times as long as calyx; limb 2-fid, with linear-oblong lobes and subulate coronal scales; petal claw and

filaments ciliate; capsule ovoid, 8–10 mm long and 3 mm broad; carpophore glabrous or scarcely pubescent, 4–5 mm long; seeds reniform, 1.2 mm long, muricate. April–June.

Steppe slopes in the lower mountain zone. — Centr. Asia: Pam.-Al., Amu D. Endemic. Described from Zeravshan valley (Karasu, Daul, Yarbash). Type in Leningrad.

77. *S. leptocaulis* Schischk. in Acta Inst. Botan. Ac. Sc. URSS, ser. 1, III (1936).

Perennial; taproot stout, multicipital; stems numerous, slender, erect, glabrous or very slightly scaberulous in lower part, simple, 40–60 cm long; leaves narrowly linear, 2–5 cm long and 0.5–2 mm broad, glabrous, sometimes ciliate especially in lower part, acute, 1-veined, attenuate toward base, with axillary fascicles of narrower leaves; flowers in a loose racemiform inflorescence, erect, on slender pedicels 5–15 mm long; bracts linear-lanceolate, acuminate, 3–5 mm long, with white scarious margin; calyx coriaceous, glabrous, 12–14 mm long; teeth obtuse, broadly scarious-margined, ciliate; petals lurid, one and a half times as long as calyx; limb cleft to the middle or lower down into oblong lobes; coronal scales minute or reduced to bosses or none; claw enlarged at summit, slightly ciliate as are filaments; carpophore ca. 5 mm long, glabrate; capsule ovoid, 8 mm long. June–July.

Gravelly slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Kugitang (Markushi village). Type in Leningrad.

Section 8. *Suffruticosae* Rohrb. Monogr. (1868) 74, 189. — Plants more or less woody at base; axillary fascicles present; calyx cylindric, sparingly pubescent or glabrous, with scabrous nerves.

Series 1. *Fruticulosae* Schischk. — Leaves subulate, sometimes spinescent.

78. *S. altaica* Pers. Syn. I (1805) 497; Ldb. Fl. Ross. I, 315; Kryl., Fl. Zap. Sib. V, 1060. — *S. altaica* var. *typica* Trautv. in Bull. Soc. Nat. Mosc. XXXIII, 1 (1860) 151. — *S. fruticulosa* Schischk. in syn. ex Kryl. Fl. sib. occid. V (1931) 1060, non Sieb. nec M. B. — *Cucubalus fruticulosus* Pall. Reise II, Anh. (1773) 739, tab. 7. — Ic.: Pall., l. c.; Ldb., l. c., pl. Fl. Ross. II, tab. 172. — Exs.: HFR no. 2977.

Perennial, woody in lower part; stems numerous, ascending, branched, 15–50 cm long, densely leafy, scabrous in lower part, glabrate and viscous above; leaves linear or subulate, 1.5–3 cm long and 0.5–1 mm broad, with rough margins, ciliate at base; flowers in a racemose inflorescence; pedicels as long as calyx, bracteolate about the middle, the bracteoles ovate, acuminate with scarious-ciliate margin; calyx cylindric-clavate, 12–15 mm long, very sparingly hairy; teeth obtuse, with scarious ciliate margin; petals white, one and a half times to twice as long as calyx; limb deeply 1-parted into linear lobes, with coronal scales; capsule oblong-ovoid, 8–10 mm long, one and a half times to twice as long as the puberulent carpophore. June–July.

Rocks, stony slopes, and desert-steppes. — European part: V.-Kama, (S. Ural); W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say; Centr.

Asia: Ar.-Casp. (Karsakpai), Balkh., Dzu.-Tarb. **Gen. distr.:** Chinese Dzungaria. Described from Altai. Type in Leningrad.

79. *S. alexandrae* Keller in Trav. Soc. Nat. Kazan. XLIV, livr. 5 (1912) 71; Kryl., Fl. Zap. Sib. V, 1061. — *S. altaica* β *grandiflora* C. A. M. in Ind. IX sem. Hort. Petrop. (1843) 87. — *S. altaica* var. *hystrix* Trautv. in Bull. Soc. Nat. Mosc. XXXIII, 1 (1860) 151.

647 Perennial, woody at base; stems numerous, 25–45 cm long, branched, glabrous, viscid at summit; leaves linear-lanceolate to linear, 3–8.5 cm long and 2.5 mm broad, acute, subspinescent, very slightly ciliate at base; flowers 2–5 in a paniculate-racemose terminal inflorescence; pedicels long, bracteolate above the middle; bracteoles a single pair, sheathing at the oval base, subulate above, scarious, ciliate; calyx cylindric-clavate, 1.5–2.5 cm long and 3–4 mm broad, puberulent; teeth short, triangular, acute or obtuse, scarious-margined; petals white; limb deeply 2-parted, the oboval lobes narrowing toward base; coronal scales present; capsule oblong-ovoid, 12–15 mm long, twice as long as the subglabrous carpophore; seeds triangular-reniform. June.

Stony slopes. — Centr. Asia: Balkh. (Zaisan Lake), Dzu.-Tarb., T. Sh. (Andrakai Mountain). **Gen. distr.:** Chinese Dzungaria. Described from Zaisan (between Kaldzhir and Chiganchi rivers). Type in Leningrad.

Series 2. **Cretaceae** Schischk. — Leaves to 13 mm long, linear or spatulate-linear, not spinescent; mostly plants of chalk and limestone slopes.

80. *S. cretacea* Fisch. in Spreng. Syst. veg. II (1825) 405; Ldb. Fl. Ross. I, 322; Rohrb. Monogr. Silene 135; Shmal'g., Fl. I, 138. — Ic.: Fl. Yugo-Vost., Fig. 316. — Exs. HFR no. 2011.

Perennial; stems numerous, whitish, woody at base, 8–30 cm long, scabrous in lower part, sometimes viscid above; leaves linear, 5–13 mm long and 1–2 mm broad, thickish, acute, rough-margined, ciliate at base, often recurved, with axillary fascicles; flowers solitary or else 2 or 3, terminal; pedicels as long as calyx; calyx cylindric-clavate, 17–20 mm long, glabrous or on the nerves slightly pubescent; teeth lanceolate, acutish, scarious-margined; petals whitish, suffused with pink, one and a half times as long as calyx; limb parted to three-quarters into oblong-linear lobes; coronal scales none; capsule oblong, 1–1.2 cm long; carpophore glabrous, ca. 6 mm long. May–July.

Slopes of chalky hills. — European part: V.-Don, L. Don. Endemic. Described from S. E. parts of European Russia. Type in Leningrad.

81. *S. suffrutescens* M. B. Beschreibung der Länder zwischen der Fl. Terek u. Kura am caspischen Meere (1800) 174; Fl. taur.-cauc. I (1808) 340; Ldb. Fl. Ross. I, 322; Boiss. Fl. Or. I, 616; Rupr. Fl. Cauc. 185; Grossg., Fl. Kavk. II, 414. — *S. fruticulosa* M. B. Tableau des provinces situées sur la côte occidentale de la mer caspienne entre les fleuves Terek et Koura (1798) 115, non *Cucubalus fruticulosus* Pall. (1773), nec *S. fruticulosa* Sieb. — *S. caspica* Pers. Syn. pl. I (1805) 497; Rohrb. Monogr. (1868) 190; Williams in Journ. Linn. Soc. XXXII (1896) 148, non

S. caspica Rchb. Pl. crit. III (1825) t. 263. — *S. leptopetala* Schrenk in Bull. phys. math. Acad. Pétersb. II (1844) 198. — Ic.: M. B. Tabl. no. 17.

Perennial, woody at base; stems ascending, simple or branched, puberulent, 25–40 cm long; leaves spatulate-linear, 7–12 mm long and 1–4 mm broad, subobtuse or mucronulate, covered with short grayish hairs, petiolate, with axillary fascicles; flowers solitary to several; pedicels equaling to twice as long as calyx; bracts herbaceous, lance-linear; calyx to 10–15 (18) mm long, narrowly clavate, scabrous-puberulent or glabrous, with triangular obtuse teeth; petals white; limb 2-lobed to one-quarter, with short coronal scales; claw glabrous; capsule ovoid, ca. 10 mm long, about twice as long as the pubescent or subglabrous carpophore; seeds reniform, 1–1.5 mm long. June–July.

Gravelly and stony, mostly calcareous slopes. — European part: L. V.; Caucasus: E. Transc.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh. (W. part), Kyz. K. Endemic. Described from Kyzyl-Kum. Type in Leningrad.

Section 9. **TOMENTELLAE** Schischk. — Flowers long-pedicel, erect, in a paniculate inflorescence; calyx long, pubescent, cylindric-clavate; petals 2-lobed, whitish, with coronal scales; filaments ciliate.

82. *S. tomentella* Schischk. in Acta Inst. Botan. Ac. Sc. URSS, ser. 1, II (1936) 146. — Ic.: l. c., fig. 4.

Perennial, woody and much branched at base; herbaceous stems numerous, erect, 22–30 cm long, simple or sparsely branched, puberulent in lower part, the upper internodes glabrous and viscid; leaves narrowly lanceolate, 4–7 cm long and 2–7 mm broad, the lower long-petioled, the upper smaller and sessile, with small-leaved axillary fascicles; inflorescence racemose or rarely stems monanthous; pedicels ascending, 5–20 mm long; bracts acute, the broadly scarious margin villous-ciliate; calyx cylindric-clavate, 10–23 mm long; teeth lanceolate, acutish, the scarious margin ciliate; petals whitish, one and a half times as long as calyx; limb parted to two-thirds, without coronal scales; petal claw and filaments ciliate; capsule ovoid, 11 mm long and 6 mm broad; carpophore as long as capsule, minutely puberulent; seeds reniform, finely striate, ca. 1.5 mm long. May.

Stony and gravelly slopes. — Centr. Asia: Kyz. K., Amu D. Endemic. Described from Kyzyl-Kum (Ak-Tau and Bukan-Tau mountains). Type in Leningrad.

83. *S. claviformis* Litw. in Trav. Mus. Bot. Acad. Pétersb. III (1907) 99.

Perennial; stems ascending, 20–40 cm long, woody at base, puberulent in lower part, glabrous and viscous above; leaves linear to linear-subulate, 2–5 cm long and 1–3 mm broad, acute, scabrous-pubescent, with axillary fascicles; inflorescence racemiform; pedicels 15–25 mm long; bracts lanceolate with membranous ciliate margin; calyx cylindric-clavate, 12–13 mm long, puberulent, the obtuse teeth broadly scarious-margined; petals white, one and a half times as long as calyx; limb 2-cleft to below the middle, without coronal scales; claw ciliate as are the filaments;



PLATE XXXIX. 1. *Silene incurvifolia* Kar. et Kir.: capsule with carpophore.— 2. *S. guntensis* B. Fedtsch.— 3. *S. pamirensis* (H. Winkl.) Probr.— 4. *S. karaczukuri* B. Fedtsch.— 5. *S. popovii* Schischk.— 6. *S. kuschakewiczii* Rgl.

capsule oblong, 9–10 mm long, one and a half times to twice the length of the puberulent or subglabrous carpophore, this 5–6 mm long; seeds triangular-reniform, minutely tuberculate. April–May.

Gravelly, argillaceous, sandy, and wormwood-covered slopes. — Centr. Asia: Mtn. Turkm., Pam.-Al., W. T. Sh. (Kara-Tau). Endemic. Described from the sources of mouth of the Ashkhabad River. Type in Leningrad.

84. *S. heptapotamica* Schischk. in Acta Inst. Botan. Ac. Sc. URSS, ser. I, 2 (1936) 147.

Perennial, scabrous-puberulent throughout, the internodes sometimes viscid; taproot rather long, vertical, multicipital, giving rise to numerous short sterile shoots and flowering stems 10–25 cm long; leaves linear to linear-lanceolate, 1–6 cm long and 1–2.5 mm broad, acute, tapering toward base, sometimes with axillary fascicles; flowers distant, forming a racemiform inflorescence or sometimes solitary; pedicels ascending, 7–15 mm long; bracts linear lanceolate, scarious-margined, 5 mm long; calyx tubular, 14–18 mm long, puberulent teeth obtuse, with scarious ciliate margin; petals whitish (?), one and a half times as long as calyx; limb parted to two-thirds into oblong lobes; coronal scales lanceolate, acute, 0.75 mm long; claw ciliate; filaments hairy; capsule oblong-ovoid, 8–10 mm long; carpophore glabrous, 6 mm long. May–June.

Sands. — Centr. Asia: Balkh. Endemic. Described from Kopal ravine (between Chingidy and Karacheku). Type in Leningrad.

85. *S. semenovii* Rgl. in Bull. Soc. Nat. Mosc. XXXIX, 2 (1866) 536; Rohrb. Monogr. *Silene* 195; Williams in Journ. of Linn. Soc. XXXII (1896) 151; B. Schischk. in Not. Syst. Herb. Petropol. VI, 3 (1926) 5.

Perennial; leaves erect, sparingly branched, 30–60 cm long, covered with very short retrorse hairs, in upper part usually viscous; leaves lance-linear to linear 4–9 cm long and 2–5 mm broad, acute, the lower petiolate, the median and upper sessile, puberulent; flowers 1–3 at tips of stems and branches; pedicels pubescent, equaling or twice to thrice as long as calyx; bracts lanceolate, scarious-margined; calyx cylindric-clavate, 15 mm long and 3 mm broad, puberulent, with alternately obtusish and acute teeth; petals whitish above, roseate beneath, one and a half times to twice as long as calyx; limb 2-cleft to the middle; coronal scales narrowly linear, 3–4 mm long; claw enlarged and densely ciliate at summit; filaments hairy; capsule ovoid, 10–14 mm long, twice the length of the puberulent carpophore; seeds tuberculate, 1 mm long, grooved on the back. May–June. (Plate XL, Figure 3).

Dry slopes and occasionally steppes. — Centr. Asia: Dzu.-Tarb. (Dzhungaria-Tarbagatai area), T. Sh. Endemic. Described from Zailiiskii Ala-Tau. Type in Leningrad.

Section 10. **SPERGULIFOLIAE** Boiss. Fl. Or. I (1867) 572, 611. — Calyx pubescent, 6–16 mm long; filaments glabrous; flowers short-pedicel, in dense cymes forming racemose-paniculate or loosely capitate inflorescences.

Series 1. **Polyphyllae** Schischk. — Plants woody at base, with axillary fascicles of relatively narrow leaves.

86. *S. spergulifolia* (Desf.) M. B. Fl. taur.-cauc. III (1819) 305; Ldb. Fl. Ross. I, 309; Boiss. Fl. Or. I, 612; Rohrb. Monogr. Silene 206; Williams in Journ. Linn. Soc. XXXII (1896) 161; Shmal'g., Fl. I, 142. — *S. spergulifolia* var. *clavata* et var. *ellipsoidea* Trautv. in A. H. P. II (1873) 508. — *Cucubalus spergulifolius* Desf. in Ann. Mus. Paris XI (1808) 441, tab. 43. — Ic.: Desf., l. c., tab. 43; Rchb. Ic. Fl. Germ. VI, t. 292.

653 Perennial, woody at base; stems numerous, 10–40 cm long, crisp-puberulent as are the leaves, glandular at summit; leaves spatulate-linear to linear, subacute, 1–2 cm long and 1–2 mm broad, with axillary fascicles of narrower leaves; flowers short-pedicel, in 3-flowered dichasia often approximate at the summit of the stem; calyx cylindric, 5–12 mm long and 2 mm broad, glandular-pubescent, with obtuse teeth; fruiting calyx not inflated, tightly enclosing the capsule; petals whitish, one and a half times as long as calyx; limb cleft to the middle; coronal scales 0.3–0.4 mm long; claw scarcely enlarged at summit, glabrous; capsule pyriform, 5 mm long, in lower half 3 mm broad; carpophore pubescent, 2.5–5 mm long; seeds reniform, to 1 mm long, bluntly tuberculate, very slightly grooved on the back. June–July.

Stony and more rarely turf slopes, and rocks. — Caucasus: Cisc., Main Range, Dag., E. and S. Transc., Tal. **Gen. distr.:** As. Min., Arm.-Kurd., Iran. Described from Armenia. Type in Paris.

87. *S. brotherana* Som. et Lev. in A. H. P. XIII (1893) 36 et XVI (1900) 69; Williams in Journ. Linn. Soc. XXXII (1896) 40; Grossg., Fl. Kavk. II, 414. — ? *S. armeniaca* Rohrb. Monogr. Silene (1868) 209.

Perennial, woody and crisp-puberulent in lower part, sometimes glandular above; stems numerous, 20–40 cm long; leaves spatulate-linear to linear, 1–2 cm long and 1–2 mm broad, subacute, with axillary fascicles of narrower leaves; flowers in a racemiform terminal panicle; calyx clavate, ca. 10 mm long, inflated in fruit, 5–6 mm broad, glandular-pubescent, the obtuse teeth with scarious ciliate margin; petals whitish, one and a half times as long as calyx; limb cleft to the middle or lower down into linear lobes; coronal scales broad-ovate, 0.4 mm long; claw scarcely enlarged at summit, ciliate or glabrous; capsule pyriform, 5 mm long and 3 mm broad; carpophore pubescent, 1–4 mm long. June–July.

Stony slopes and taluses. — Caucasus: S. and E. Transc. **Gen. distr.:** Arm.-Kurd. Described from Atskhur. Type in Florence.

Note. To judge by the description of *S. armeniaca* Rohrb., that species is very similar to, if not identical with, *S. brotherana* Som. et Lev. Unfortunately, we have not been able to examine Rohrbach's authentic specimens. Should the identity of the two species be proved in the future, priority rule would call for retention of the name *S. armeniaca* Rohrb.

88. *S. brahuica* Boiss. Fl. Or. I (1867) 615; Rohrb. Monogr. 192; Williams in Journ. Linn. Soc. XXXII (1896) 149.

Perennial, woody at base; stems numerous, ascending in lower part, 15–35 cm long, covered with recurved hairs, simple or slightly branched at summit; leaves linear-lanceolate to linear, 2–3 cm long and 1–3 mm broad, 1-veined, acute, puberulent, ciliate at base, with densely leafy axillary

fascicles; flowers short-pedicel, in 3-5-flowered dichasia forming a short narrowly paniculate inflorescence; bracts lanceolate, scarious, acute, ciliate; calyx cylindric-clavate, 11-14 mm long, covered, especially on the veins, with simple hairs sometimes interspersed with glandular; teeth ovate-lanceolate, with scarious ciliate margin; petals white, one and a half times as long as calyx; limb cleft to the middle into oblong lobes; coronal scales oblong, obtuse; claw enlarged at summit; capsule ovoid, scarcely longer than the puberulent carpophore; seeds reniform. May - July.

Stony slopes. - Centr. Asia: T. Sh., Pam.-Al., Mtn. Turkm. **Gen. distr.:** Iran. Described from Afghanistan and Baluchistan. Type in Geneva.

Series 2. **Repentes** Schischk. - Stems herbaceous; leaves lanceolate.

89. **S. repens** Patr. in Pers. Syn. I (1805) 500; Ldb. Fl. Ross. I, 308; Turcz. Fl. baic.-dahur. I, 208; Rohrb. Monogr. Silene, 206; Shmal'g., Fl. I, 142; Williams in Journ. Linn. Soc. XXXII (1896) 161; Kryl., Fl. Zap. Sib. V, 1068. - *S. gypsophila* Desf. Cat. Hort. Paris., éd. 3 (1829) 184, nom. nud. - *S. gypsophiloides* Schrank in Denkschr. Bot. Gesellsch. Regensb. II (1822) 45. - *Cucubalus congestus* Willd. ex Cham. et Schlecht. in Linnaea I (1826) 39. - Ic.: Ldb., Ic. pl. Fl. Ross. V, t. 425; Kom. and Alis., Opred. rast. Dal'nevost. kraya I, plate 149, III. - Exs.: HFR no. 605.

Perennial, puberulent throughout; rootstock long-creeping, slender; stems several, ascending at base, 15-60 cm long; leaves lance-linear to linear, ciliate at the attenuate base, 2-7 cm long and 2-7 mm broad, with axillary fascicles of narrower leaves; flowers short-pedicel, in axillary and terminal cymes forming a narrowly paniculate inflorescence; calyx cylindric-clavate, somewhat inflated at summit, 11-16 mm long and 3-5 mm broad, puberulent, with obtuse scarious-margined teeth; petals whitish, about twice as long as calyx; limb lobed to one-third, the lobes broad-ovate; coronal scales oblong, obtuse, ca. 1.5 mm long; claw enlarged at summit, glabrous; capsule ovoid, 6-7 mm long; carpophore puberulent, 5-6 mm long; seeds reniform, ca. 1 mm in diameter, striate. June - August.

Steppe and water meadows, turf and stony hill slopes, and sandy river-banks. - European part: U. V., V.-Kama, Transv.; W. Siberia: all regions; E. Siberia: Yen., Ang.-Say., Dau., Lena-Kol.; Far East: Kamch., Okh., Uda, Ze.-Bu., Sakh., Uss.; Centr. Asia: Dzu.-Tarb., T. Sh. **Gen. distr.:** Mong., Dzu.-Kah., N. E. Tibet, Jap., Manch., Korea. Described from the shores of Lake Baikal. Type in Paris.

90. **S. cephalantha** Boiss. Fl. Or. I (1867) 613; Rohrb. Monogr. Silene, 197; B. Schischk. in Bull. du Mus. de Géorgie I (1922) 12; Grossg., Fl. Kavk. II, 415. - *S. repens* Ldb. Fl. Ross. I, 308 quo ad pl. transcauc. - *S. caucasica* β major Rupr. Fl. Cauc. I (1869) 186. - *S. repens* var. *transcaucasica* Trautv. in A. H. P. II, 2 (1873) 508; Will. Revisio Sil. 161. - *S. transcaucasica* Bordz. in Acta Hort. Juriev. XIII, 1 (1912) 19.

Perennial; rootstock creeping; stem ascending at base, 20-60 cm long, simple, puberulent; leaves oblong-lanceolate, 3-5 cm long and 4-8 mm broad, puberulent or glabrous, usually ciliate-margined; axillary fascicles none; flowers short-pedicel, in a fairly dense or loose head at the summit of the stem or in few-flowered clusters at tips of branches, these

commonly appressed to stem; bracts ovate-lanceolate, herbaceous, puberulent or ciliate; calyx campanulate-conic, 10–12 mm long and 4 mm broad, crisp-hairy; teeth oblong, obtuse, the scarious margin ciliate; petals white above, yellowish-green beneath, one and a half times as long as calyx; limb lobed to one-third, the lobes oblong-ovate; coronal scales to 1 1/2 mm long; claw auriculate at summit, glabrous; filaments glabrous or ciliate; capsule ovoid, 6–8 mm long and 4 mm broad; carpophore puberulent, 5–6 mm long; seeds to 1 1/2 mm long. June–July.

Alpine and subalpine meadows. — Caucasus: E. and S. Transc. **Gen. distr.:** Turkish Armenia. Described from Palantaken Range (Turkish Armenia). Type in Geneva.

91. *S. caespitosa* Stev. in Mém. Soc. Nat. Mosc. III (1812) 262, non Salisb. Prodr. (1796) nom. nud.; Boiss. Fl. Or. I, 653; Rupr. Fl. Caucasi, 198; Rohrb. Monogr. Sil., 133; Williams in Journ. Linn. Soc. XXXII (1896) 90; Grossg., Fl. Kavk. II, 412. — Ic.: Stev. in Trans. Linn. Soc. XI (1815) t. 35.

Perennial; taproot rather stout, penetrating deep into crevices of calcareous rocks, multicapital, giving rise to short sterile shoots and numerous flowering stems, these 10–35 cm long, simple, glabrous (scabrous-punctate when dry), pubescent only below the inflorescence, brittle, with 4 or 5 leaf pairs; radical leaves narrowly linear, 1–7.5 cm long and 1–1.5 mm broad, mucronulate, ciliate at base; cauline leaves 0.5–1 cm long, recurved; flowers in a loose few-flowered capitulate inflorescence, rarely solitary at the summit of the stem; bracts small, herbaceous, ciliate; pedicels ca. 3 mm long, densely pubescent; calyx cylindric-clavate, 7.5–8.5 mm long, densely pubescent, with ovate obtuse teeth; petals greenish-white; limb cuneate-linear, shallowly 2-lobed; coronal scales very short, ovate; claw glabrous; capsule ovoid-globular, 4.5 mm long; carpophore glabrous, 2–3 mm long. June–July.

Crevices of calcareous rocks, at altitudes between 1,600 and 2,200 m. — Caucasus: Main Range (E. part). Endemic. Described from Sudur (Kubin Mountain pass). Type in Helsinki.

Series 3. *Supinae* Schischk. — Plants woody at base; axillary fascicles none.

656

92. *S. supina* M. B. Fl. taur.-cauc. I (1808) 336; III (1819) 304; Ldb. Fl. Ross. I, 322, ex parte; Boiss. Fl. Or. I, 614, part; Shmal'g., Fl. I, 139; Williams in Journ. Linn. Soc. XXXII (1896) 162. — *S. supina* α *genuina* Rohrb. Monogr. (1868) 207, ex parte. — Ic.: M. B. Cent. pl. rar. ross. I (1810) t. 3; Sims, Bot. Mag. t. 1997. — Exs.: HFR no. 2984; Bornm. Pl. exs. Bulg. or. (1889) no. 3.

A much branched undershrub, with numerous sterile and flowering stems, these puberulent, 15–40 cm long; leaves lance-linear to linear, 2–4 cm long and 2.5–5 mm broad, short-hairy; flowers several on the stem; pedicels short, erect; bracts linear-lanceolate, herbaceous; calyx cylindric, 17–29 mm long and 2.0–2.5 mm broad, covered with simple as well as glandular hairs; teeth ovate, obtuse, the scarious margin ciliate; petals whitish, one and a half times as long as calyx; limb cleft to below the middle into oblong lobes; coronal scales oblong, 1.25 mm long; claw auriculate and ciliate at summit; carpophore covered with very short hairs, 5 mm long. June–August.

Rocks and calcareous slopes. — European part: V.-Don, Bl., Crim.; Caucasus: Cisc., Main Range foothills. **Gen. distr.:** N. Balk. (Bulgaria, Rumania). Described from the environs of Pyatigorsk. Type in Leningrad.

93. *S. pruinosa* Boiss. Diagn. Ser. I, 1 (1842) 23; Fl. Or. I, 612; Williams in Journ. Linn. Soc. XXXII (1896) 163; Grossg., Fl. Kavk. II, 414. — *S. supina* β *pruinosa* Rohrb. Monogr. (1868) 208.

Perennial, woody at base, densely puberulent; stems densely leafy, 15–30 cm long, thickened at nodes; leaves lance-linear, 1–2 cm long and 2–3 mm broad, 1-veined, acute, ciliate in lower part, puberulent on both surfaces; pedicels shorter than calyx; flowers at tips of stems and branches; bracts ovate, acutish, herbaceous; calyx tubular, 13–16 mm long and 2.5 mm broad, glandular-pubescent, with obtuse broadly scarious-margined teeth; petals white, one and a half times as long as calyx; limb cleft to the middle; coronal scales ovate, obtuse; claw very slightly enlarged at summit, glabrous; capsule ovoid; carpophore pubescent, ca. 8 mm long.

Stony slopes. — Not found in the USSR. Occurring in adjoining parts of Turkey, Ashikhdad Mountain, near the Kagyzman district of Kars region. **Gen. distr.:** As. Min., Arm.-Kurd. Described from Syria and Cappadocia. Type in Geneva.

Section 11. **AURICULATAE** Boiss. Fl. Or. I (1867) 572, 615. — Flowers perfect, erect; calyx rather large, cylindric or slightly inflated, with obtuse teeth, covered with simple as well as glandular hairs; petals 2-lobed; coronal scales always present; claw auriculate at summit; filaments glabrous; carpophore long.

Series 1. **Aucherianae** Schischk. — Rather high plants, somewhat woody at base; leaves linear-lanceolate; petals white or roseate; claw glabrous; calyx cylindric or very slightly inflated.

94. *S. aucheriana* Boiss. Diagn. Ser. I, 1 (1842) 27; Fl. Or. I, 617; Rohrb. Monogr. 36; Williams in Journ. Linn. Soc. XXXII (1896) 95. — *S. hohenackeri* Boiss. Diagn. Ser. II, 1 (1853) 75; Grossg., Fl. Kavk. II, 415. — *S. supina* var. *latifolia* Hoh. Enum. Talysch (1838) 162 (non M. B.); Ldb. Fl. Ross. I, 322. — *S. aucheriana* β *hohenackeri* Boiss. Fl. Or. I (1867) 617, ex parte. — *S. aucheriana* lus. 2 Rohrb. Monogr. (1868) 136.

Perennial, woody in lower part, velvety-puberulent; stems several, 30–40 cm long, simple or branched at summit; leaves linear-lanceolate, 2–3.5 cm long and 2–4 mm broad, 1-veined, the lower petiolate, the upper sessile; flowers in a loose panicle inflorescence, on pedicels 2–5 mm long; bracts linear-lanceolate, scarious, glandular-pubescent; calyx cylindric, 10–13 mm long and 3 mm broad, with obtuse teeth; petals whitish, about twice as long as calyx; limb cleft to the middle into obovate lobes; coronal scales broad-ovate, ca. 1.5 mm long; claw auriculate at summit, glabrous; capsule ovoid, 8 mm long and 4 mm broad; carpophore pubescent, 5 mm long. May–July.

Stony slopes. — Caucasus: S. Transc. **Gen. distr.:** Arm.-Kurd., Iran. Described from Iran (Elvend and Dalmkou mountains). Type in Geneva.

*95. *S. ispirensis* Boiss. et Huet in Boiss. Diagn. pl. or. nov. ser. 2, V (1856) 55; Grossg., Fl. Kavk. II, 475. — *S. montbretiana* Boiss. Fl. Or. I (1867) 614, ex parte; Rohrb. Monogr. 192, part.

658 Perennial, woody at base, covered with very short retrorse simple as well as glandular hairs; stems 15–30 cm long, with ascending branches; leaves lance-linear, 1.5–3 cm long and 2.5–5 mm broad, 1–3-veined; those of sterile radical shoots usually narrower and long-petioled; flowers in 3-flowered dichasia at tips of stems and branches, forming a paniculate inflorescence; pedicels one-fourth to half as long as calyx; bracteoles linear-lanceolate, 4–5 mm long, usually inserted just below the flower; calyx cylindrical, 15–17 mm long and 3 mm broad, covered with simple as well as glandular hairs; teeth obtuse, scarious-margined; petals whitish, one and a half times as long as calyx; limb cleft to the middle into oblong obtuse lobes; coronal scales 0.5–1 mm long; claw auriculate at summit, glabrous; capsule ovoid, 12 mm long and 5 mm broad; carpophore puberulent, 5–7 mm long. June–July.

Dry slopes. — Not known to date from the USSR but possibly occurring in S. Transc. The plant was collected in the Oltin area (Turkish border). Gen. distr.: Arm.-Kurd. Described from Ispir. Type in Geneva.

96. *S. bornmülleri* Freyn in Oesterr. Bot. Zeitschr. XII (1891) 363; Williams in Journ. Linn. Soc. XXXII (1896) 162; Grossg., Fl. Kavk. II, 415.

Perennial, woody at base, puberulent; stems 20–40 cm long, branched at summit; lower leaves lanceolate, acute, petiolate; upper leaves sessile, 1-veined or obscurely 3-veined, 3–4 cm long and ca. 6 mm broad; inflorescence a few-flowered panicle; pedicels shorter to very slightly longer than calyx; calyx 10–15 mm long and 3–5 mm broad, inflated in fruit and then to 6–8 mm broad, covered with long crisp hairs interspersed with glandular ones; teeth obtuse, their scarious margin ciliate; petals white, about twice as long as calyx; limb cleft to one-third or to the middle, the lobes ovate; coronal scales ovate, obtusish, ca. 1 mm long; claw auriculate at summit, glabrous; capsule ovoid, 8–9 mm long and 4 mm broad; carpophore woolly, 2.5–7 mm long; seeds triangular-reniform, ca. 1 mm long. June–July.

Dry slopes. — Caucasus: S. Transc. Gen. distr.: Arm.-Kurd. Described from Ildiz-Dash (Sivas). Type in Vienna.

97. *S. prilipkoana* Schischk. sp. nova in Addenda V, p. 676.

Perennial, woody and profusely branched at base, almost suffrutescent; herbaceous stems 15–25 cm long, densely covered with short patulous or retrorse hairs; leaves obovate, 12–20 mm long and 3–8 mm broad, densely puberulent, 3-veined in lower part, short-acuminate at summit, narrowing toward base; flowers terminal, solitary or in 3-flowered dichasia, the lateral ones long-pedicelated; bracts lance-linear, herbaceous; calyx clavate, 12 mm long and 5 mm broad, with 10 prominent nerves anastomosing in upper part, whitish-scarious between the nerves; petals lurid, one and a half times as long as calyx; limb cleft to the middle into oblong lobes; coronal scales ovate, ca. 1 mm long; claw auriculate at summit, glabrous; filaments glabrous; capsule ovoid, gradually attenuate toward summit, 9 mm long and 4 mm broad; carpophore minutely puberulent, 3 mm long; seeds triangular-reniform, obscurely and minutely tuberculate on the back, ca. 1 mm long. June.

Stony slopes. — Caucasus: S. Transc. Endemic. Described from Nakhi-chevan ASSR (near Akhur). Type in Baku; cotype in Leningrad.

59 98. *S. crispans* Litw. in Trav. Mus. Bot. Acad. Pétersb. III (1907) 99. — *S. gaudanensis* Litw., l. c. (1907) 102.

Perennial, puberulent, with leafy sterile shoots; stems ascending, 5–30 cm long, commonly simple; leaves linear-lanceolate, 1–1.5 cm long, 0.5–1.5(2.5) mm broad, acute, often subfalcate; flowers terminal, solitary or 2–8 together; pedicels 2–10 mm long; bract small, narrowly lanceolate; calyx cylindric, 12–18 mm long, puberulent, with obtuse teeth; petals white or roseate, one and a half times as long as calyx; limb cleft to the middle or to two-thirds into linear-oblong lobes; coronal scales present; claw enlarged at summit, glabrous; capsule ovaloid, 6–7 mm long, equaling to twice as long as the puberulent carpophore; seeds reniform, grooved on the back, the flat faces tuberculate. May–June.

Dry gravelly slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from Gaudan. Type in Leningrad.

99. *S. popovii* Schischk., nom. nov. — *S. tenerima* M. Pop. Descript. plant. nov. in Turk. lect. Pochv. eksped. v bass. rr. Syr-Dar'i i Amu-Dar'i, No. II (1916) 40, non Presl., Delic. Prag. (1822) 217.

Perennial, puberulent throughout, loosely tufted, with numerous densely leafy sterile shoots; flowering stems 15–20 cm long; leaves acute, those of sterile shoots and the lower cauline narrowly linear, 3.5–5 cm long and 0.5–1.5 mm broad, the upper cauline linear-lanceolate, 1.5–2.5 cm long and 2–4 mm broad; pedicels 5–10 mm long; flowers 3–7, terminal; bracts herbaceous, resembling the upper foliar leaves; calyx cylindric, 13–15 mm long and 2–3 mm broad, puberulent, with short ovate obtuse teeth; petals bright pink; limb cleft into linear obtuse lobes, these sometimes 2-fid; capsule oblong, ca. 10 mm long, in upper part 4 mm broad, tapering at summit, in maturity exerted to half its length; carpophore minutely scaberulous. 4–5 mm long. End of April–June. (Plate XXXIX, Figure 5).

Woody and southern slopes. — Centr. Asia: Pam.-Al. (Shakhrisayab range near the villages of Koinar and Aman-Kupan). Endemic. Described from the locations indicated. Type in Tashkent; cotype in Leningrad.

100. *S. indeprensa* Schischk. in Acta Inst. Botan. Ac. Sc. URSS. Ser. 1, III (1936).

60 Perennial; taproot stout, multicapital; stems numerous, erect or at base ascending, covered with short grayish and sometimes glandular hairs, 20–45 cm long, slightly branched at summit, thickened at nodes; radical leaves spatulate-linear; 2–3 cm long and 0.5–2 mm broad, acute, velvety-puberulent, gradually narrowing toward base; cauline leaves similar, sometimes with axillary fascicles; flowers commonly solitary or 3 at tips of stems and branches; pedicels stoutish, 1–12 mm long; bracts herbaceous, ovate-lanceolate, 2–3 mm long; calyx campanulate, slightly inflated, 12–15 mm long and 3–6 mm broad, puberulent, sometimes glandular, with 10 usually reddish nerves; teeth obtuse; petals one and a half times as long as calyx, white; limb cleft to below the middle into oblong lobes;

coronal scales broad-ovate, obtuse, ca. 1 mm long; claw exceeding calyx, glabrous, slightly enlarged at summit; capsule ovoid, 7–9 mm long and 4 mm broad; carpophore densely crisp-puberulent, 4–6 mm long. June; fr. July.

Rock crevices. — Centr. Asia: Mtn. Turkm. (Chapan-Dag, Suluklyu). Endemic. Described from Chapan-Dag. Type in Leningrad.

Series 2. *Pachyneurae* Schischk. — Leaves prominently 3-nerved.

101. *S. pachyneura* Schischk. in Acta Inst. Botan. Ac. Sc. URSS. Ser. 1, III (1936). — *S. arguta* β *armena* Boiss. Fl. Or. I (1867) 618; Rohrb. Monogr. 136; Williams in Journ. Linn. Soc. XXXII (1896) 93. — *S. arguta* Grossg., Fl. Kavk. II, 413, non Fenzl.

Perennial, puberulent throughout, scarcely woody at base, with short leafy sterile shoots; flowering stems ascending, slightly branched at summit, 30–40 cm long; leaves linear-lanceolate, 3–4 cm long and 3–5(7) mm broad, acute, prominently 3–5-nerved beneath, often recurved, sometimes falcately spreading; flowers at tips of stems and branches, in 3-flowered dichasia, more rarely solitary; bracteoles narrowly lanceolate, herbaceous, scarious-margined, inserted just below the flower; calyx cylindric-clavate, 15–16 mm long, puberulent and covered, especially on the nerves, with long recurved stiffish hairs; teeth obtuse; petals whitish, one and a half times as long as calyx; limb cleft to below the middle into oblong lobes; coronal scales oblong, ca. 1 mm long; claw auriculate at summit; capsule oblong, 9 mm long and 3.5 mm broad; carpophore puberulent, 3–5 mm long; seeds reniform, 1–2 mm long, bluntly tuberculate. June–July.

Rocks and stony slopes in the subalpine zone. — Caucasus: E. and S. Transc. Gen. distr.: Arm.-Kurd. Described from the environs of Malazgirt (Mus. Sanjack). Type in Leningrad.

102. *S. sisianica* Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 36; Boiss. Fl. Or. I, 617; Suppl. 98; Williams in Journ. Linn. Soc. XXXII (1896) 93. — *S. arguta* β *sisianica* Rohrb. Monogr. (1868) 136.

661 Perennial, scarcely woody at base, branched at summit, puberulent; leaves linear-lanceolate, sharply scabrous, 3–5 cm long and 2.5–5 mm broad, ascending, prominently 3-veined; flowers short-pedicel, in 3-flowered dichasia at tips of stem and of 1 or 2 rather short upright branches; bracteoles lanceolate-acuminate, with scarious ciliate margin; pedicels shorter than to equaling calyx; calyx 15 mm long and 3 mm broad, conic-campanulate, puberulent and covered with numerous long crisp hairs; teeth triangular-lanceolate, scarious-margined, obtusish; petals 18 mm long, white; limb cleft to below the middle into oblong lobes; coronal scales ovate, obtusely crenulate at summit, 1 1/2 mm long; claw auriculate at summit, glabrous; carpophore minutely puberulent, 4 mm long. July.

Stony slopes. — Caucasus: S. Transc. Gen. distr.: Iran. Described from Sisian. Type in Leningrad.

Series 3. *Pygmaeae* Schischk. — Dwarf plants with procumbent or ascending stems; cauline leaves suborbicular; petals purple or red, with glabrous claw.

103. *S. pygmaea* Ad. in Web. et Mohr, Beiträge I (1805) 59; Rohrb. Monogr. Silene 78; Rupr. Fl. Cauc. 187; Williams in Journ. Linn. Soc. XXXII (1896) 88. — *S. spathulata* M. B. Fl. taur.-cauc. I (1803) 341; Ldb. Fl. Ross. I, 320; Boiss. Fl. Or. I, 626. — *S. petraea* Ldb. in litt. ap. Schrank, Syll. I (1824) 211, non Waldst. et Kit. neque Adams. — *S. ledebourii* Heynh. Nomencl. II (1840) 667.

Perennial; stems several, 8–20 cm long, ascending, spatulous-hairy, clothed at base with remnants of dead leaves; radical leaves spatulate, obtuse, abruptly tapering to petiole and together with it ca. 3 cm long, 8 mm broad, the petiole equaling or longer than blade; cauline leaves 3 or 4 pairs, sessile, acutish, sometimes almost orbicular, to 2 cm long and 1.5 cm broad; flowers 3–7, terminal short-pediceled, fragrant; calyx 11–12 mm long and 3 mm broad, with obtuse teeth, not accrescent in fruit, patulous-hairy, sometimes purple-tinged; petals rose-purple, one and a half times to twice as long as calyx; limb cleft nearly to the middle into oblong-linear lobes; coronal scales ovate-lanceolate, ca. 1 mm long; claw auriculate at summit, scarcely ciliate or glabrous; capsule ovoid, 6 mm long and 4 mm broad; carpophore hairy, 4 mm long; seeds reniform, 1 mm long, sharply tuberculate on the back. June–August.

Rocks in the alpine zone. — Caucasus: Main Range, Daghestan, W. Transc. (Mingrelia Mountains). Endemic. Described from Osetia. Type in Leningrad.

104. *S. humilis* C. A. M. Verzeichn. Pfl. cauc. (1831) 215; Ldb. Fl. Ross. I, 320; Boiss. Fl. Or. I, 655; Rohrb. Monogr. Silene 128; Ruprecht, Fl. Cauc. 199.

Perennial; rootstock creeping, slenderly stringy; stems sprawling, ascending, puberulent, in upper part glandular; leaves broad-ovate, sometimes suborbicular, more rarely oblong, abruptly tapering to a very short petiole, together with it 5–10 mm long, 3–5 mm broad, crisp-puberulent; flowers solitary at tips of stems and branches, nodding, subsessile or borne on pedicels shorter than calyx; bracts herbaceous, lanceolate; calyx clavate, 12–15 mm long and 4–5 mm broad, glandular-puberulent, with obtuse teeth; petals red, about twice as long as calyx; limb lobed to one-third, the lobes oblong; coronal scales rounded-quadrate, to 1 mm long; claw enlarged at summit, glabrous; capsule ovoid, 10 mm long and 5 mm broad; carpophore tomentose, 2 mm long. July.

Taluses in the alpine zone, at altitudes between 2,000 and 3,000 m. — Caucasus: Centr. and E. part of the Main Range, mountains of Daghestan. Endemic. Described from Tufan-Dag. Type in Leningrad.

Series 4. *Lychnideae* Schischk. — Calyx more or less inflated, with obtuse teeth; leaves narrowly linear or lanceolate; petals commonly white, rarely purple, with ciliate claw.

105. *S. lychnidea* C. A. M. Verzeihn. Pfl. cauc. (1831) 213; Boiss. Fl. Or. I, 649 et Suppl. 106; Rupr. Fl. Cauc.; Rohrb. Monogr. Silene 213; Williams in Journ. Linn. Soc. XXXII (1896) 145; Grossg., Fl. Kavk. II, 413. — *S. graminifolia* β *lychnidea* Rgl. in Bull. Soc. Nat. Mosc. (1861) 307. — *S. subuniflora* Som. et Lev. in A. H. P. XIII, 3 (1893) 39; XVI, 72. — Ic.: Som. et Lev. in A. H. P. XVI, tab. 13. — Exs.: HFR no. 1343.

Perennial; root collar clothed at base with remnants of dead leaves; stems several, arising laterally from the basal rosette, ascending, 7–25 cm long, glandular-pubescent, sometimes glabrate (var. *glabrifolia* Rupr.); cauline leaves 1–3 pairs, rarely 4 or 5 (var. *ulukamensis* Schischk.); the lower lanceolate to lance-linear, acute, petiolate, 3–6 cm long and 3–8 mm broad, with glandular-ciliate margin, the upper smaller; flowers 1–3; pedicels long, often exceeding calyx, nodding; calyx glandular-hairy, broadly campanulate, 15–16 mm long and ca. 7 mm broad; teeth broadly triangular, obtuse, scarious-margined; petals 25 mm long, white, very rarely purple-tinged (var. *purpurea* Schischk.); limb 2-cleft to the middle or lower down into oblong lobes; claw ciliate, auriculate at summit; coronal scales ovate, rounded or retuse at apex, ca. 1.5 mm long; capsule ovoid, 12 mm long and 5 mm broad; carpophore pubescent, 7–8 mm long; seeds triangular-reniform, 1 mm long, grooved on the back, minutely tuberculate, the faces striate. July–August.

Subalpine and alpine meadows. — Caucasus: Gr. Cauc. Endemic. Described from Elbrus Mountain. Type in Leningrad.

106. *S. linearifolia* Otth. in DC. Prodr. I (1824) 374. — *S. angustifolia* M. B. Fl. taur.-cauc. I (1808) 337; III (1819) 305, non Poit. (1789), nec. *Cucubalus angustifolius* Mill.; Ldb. Fl. Ross. I, 316; Boiss. Fl. Or. I, 649; Rupr. Fl. Cauc., 196; Shmal'g., Fl. I, 138. — *S. petraea* Adams in Web. et Mohr, Beitr. I (1805) 58, non Waldst. et Kit. (1803); Rohrb. Monogr. 191; Williams in Journ. Linn. Soc. XXXII (1896) 148, excl. hab. Tibet.

Perennial; stems several, commonly ascending at base, 10–30 cm long, glabrous, simple or slightly branched at summit; radical leaves numerous; cauline 5–12 pairs, spreading or recurved; all leaves narrowly linear, 2.5 cm long and 1–2 (3) mm broad, keeled beneath, the margins smooth or ciliate; flowers solitary or several at tips of stems and branches; pedicels short, woolly-pubescent; calyx 15–16 mm long and 3–5 mm broad, puberulent or glabrous (var. *gymnocalycina* Rupr.); petals whitish above, roseate or greenish beneath, one and a half times as long as calyx; limb cleft to the middle or lower down into oblong-linear lobes; coronal scales quadrate, unequally and bluntly denticulate at apex, 1.5 mm long; claw auriculate and ciliate at summit; capsule oblong-ovoid, 7 mm long and 4 mm broad; carpophore hairy or glabrous, 5–6 mm long; seeds reniform, ca. 1 mm long, bluntly tuberculate. June–August.

Rocks in the subalpine zone, at altitudes between 1,000 and 2,000 m. — Caucasus: Main Range. Endemic. Described from the Caucasus. Type in Geneva.

107. *S. kubanensis* Som. et Lev. in A. H. P. XIII, 5 (1893) 37 et op. c. XVI (1900) 70; Williams in Journ. Linn. Soc. XXXII, 33; Grossg., Fl. Kavk. II, 415. — Exs.: HFR no. 1058.

Perennial; root collar clothed with remnants of dead leaves; stems several, arising laterally from the basal rosette, ascending, 20–40 cm long, branched in inflorescence, glandular-pubescent or glabrous, bearing 5–8 leaf pairs; leaves lanceolate, 3–5 cm long and 3–8 mm broad, acute or acuminate, petiolate, 1-veined, glandular-hairy; flowers 3–6 at tips of stems and branches, short-pedicel, erect or nodding; bracts lanceolate,

364 broadly scarious-margined, calyx broadly campanulate, somewhat inflated, 15 mm long and 5 mm broad, glandular-pubescent, with ovate obtuse teeth; petals white, one and a half times as long as calyx; limb cleft to below the middle into broadly linear lobes; coronal scales ovate, 0.5–1 mm long; claw auriculate and ciliate at summit; capsule ovoid, 8 mm long and 4 mm broad; carpophore hairy, 6–7 mm long; seeds triangular-reniform, to 1 mm long. July.

Rock crevices in mountain pine woods, at altitudes between 900 and 1,700 m. — Caucasus: N. slope of the W. part of the Main Range. Endemic. Described from the Teberda River, Elbrus Mountain, Kuban River. Type in Leningrad.

108. *S. turgida* M. B. ex Bge. Fl. Alt. Suppl. (1836) 31; Ldb. Fl. Ross. I, 307; Rohrb. Monogr. 79; Williams in Journ. Linn. Soc. XXXII (1896) 146; Kryl., Fl. Zap. Sib. V, 1051. — *S. altaica* Otth in DC. Prodr. I (1824) 374, non Pers. — *S. graminifolia* Bge. in Ldb. Fl. Alt. II, 143, non Otth. — *S. graminifolia* i *turgida* Rgl. in Bull. Soc. Nat. Mosc. (1861) 306. — Ic.: Ldb. Ic. pl. Fl. Ross. II, t. 138.

Perennial; rootstock stout, branched, giving rise to short sprawling shoots, with brown remnants of dead leaves at base and tufts of green leaves at the top; flowering stems glandular-puberulent, ascending, 5–18 cm long, simple, with 1 or 2 leaf pairs, forming a dense mat; leaves linear to linear-lanceolate, 1–3 cm long and 1–2 mm broad, glabrous except ciliate base, narrowing toward base, subulate-pointed at apex; flowers in a few-flowered raceme or solitary; pedicels glandular-pubescent, equaling or shorter than calyx; bracts resembling foliar leaves, scarious-margined; calyx ovaloid or companulate, 15 mm long, in fruit inflated and to 8 mm broad, glandular-pubescent; teeth triangular, obtuse, with scarious ciliate margin; petals white or roseate, one and a half times as long as calyx; limb cleft to the middle into oblong lobes; coronal scales obtuse; claw auriculate and ciliate at summit; filaments villous; capsule ovoid, 8 mm long and 5 mm broad, about as long as the puberulent carpophore; seeds reniform, tuberculate, grooved on the back. June–July.

Rocks and stony slopes; ascending into the alpine zone. — W. Siberia: Alt.; E. Siberia: Ang.-Say. (above Ana River and along the Usa River in the W. Sayans). Endemic. Described from Siberia. Type in Leningrad.

Series 5. *Macranthae* Rohrb. Monogr. (1868) 70, 132. — Flowers solitary to several, terminal; calyx covered with simple or glandular hairs, large (15–30 mm long); filaments glabrous; carpophore long.

367 109. *S. depressa* M. B. Fl. taur.-cauc. I (1808) 336, non Biv. (1814); Boiss. Fl. Or. I, 622; Rohrb. Monogr. Silene, 133, part; Grossg., Fl. Kavk. II, 411. — *S. depressa* var. α Ldb. Fl. Ross. I (1842) 321.

Perennial; stems several, ascending, 6–12 cm long, covered with retrorse simple hairs interspersed with glandular; radical leaves narrowly lanceolate, 3 cm long and 2–3 mm broad, acute, ciliate-margined, glabrous or scabrous on both surfaces; cauline leaves linear, similar but smaller, usually much shorter than internodes; flowers solitary or else 2 or 3 on



PLATEXL. 1. *Silene sibirica* (L.) Pers.— 2. *S. gebleriana* Schrenk.— 3. *S. semenovii* Rgl.— 4. *S. pseudotenuis* Schischk.— 5. *S. trajectorum* Kom.

the stem, subtended by a pair of terminal leaves; calyx cylindric, 27–30 mm long, covered with simple as well as glandular hairs, the teeth obtuse; petals greenish-yellow, one and a half times as long as calyx; limb lobed to one-third or to the middle; coronal scales oblong, obtuse or unequally denticulate, 1 mm long; capsule ovoid, ca. 8 mm long and 4 mm broad; carpophore hairy, 15–30 mm long; seeds rounded-reniform, ca. 1 mm long, minutely tuberculate, grooved on the back. July–August.

Rocks in the alpine zone, at altitudes between 2,000 and 2,800 m.

Caucasus: E. Transc. Endemic. Described from the Georgian SSR (environs of Tbilisi?). Type in Leningrad.

Note. Bieberstein (l. c.) records that the type was collected in the vicinity of Tiflis. This, however, is probably wrong, as the plant is unknown in the Tiflis area.

110. **S. grossheimii** Schischk. in A. Grossh. and M. Sachokia, Sketch of vegetation of Kabistan (1931) 89.

Perennial; taproot stout, multicapital; stems numerous, erect, 8–18 cm long, densely covered with short hairs; radical leaves spatulate, heavily canescent, 1–2.5 cm long and 2–4 mm broad, acute, congested; cauline leaves sessile except the lowermost, much shorter than internodes; bracts herbaceous, resembling foliar leaves but smaller; flowers solitary or paired at tips of stems; pedicels erect to subpatulous, 3–12 mm long; calyx 25 mm long, densely covered with simple crisp hairs; teeth obtuse, broadly scarious-margined; petals whitish-green; limb cleft to below the middle into oblong lobes; coronal scales oblong, ca. 1 mm long; claw glabrous, auriculate at summit; capsule ovoid-oblong, ca. 14 mm long; carpophore densely pubescent in lower part, glabrous above, 10–13 mm long; seeds reniform, striate, 1.5–2 mm long. May–June.

Slopes. — Caucasus: E. Transc. (Shemakha Pass between Perelesh-Kyul and Agridzha; between Keshe-Kereb and Gumcha Mountain. Endemic. Described from the locations indicated. Type in Baku; cotype in Leningrad.

368

111. **S. caucasica** (Bge.) Boiss. Fl. Or. I (1867) 622; Rohrb. Monogr. p. 131; Grossg., Fl. Kavk. II, 413. — *S. vallesia* β *caucasica* Bge. Ind. Dorp. (1837) 7; Linnaea XII Litter. Ber. (1838) 72. — *S. vallesia* Ldb. Fl. Ross. I, 320, non L.

Perennial; stems ascending, 7–25 cm long, puberulent, sometimes glandular; radical leaves lanceolate, 4–5 cm long and 0.5–0.6 cm broad, acute; cauline leaves 1–5 pairs, smaller; all leaves puberulent; flowers 1–5 at tips of stems, short-pedicelled, often nodding; bracts herbaceous, ovate-lanceolate, acute, glandular-puberulent; calyx tubular-cylindric, 18–20 mm long and 4–5 mm broad, glandular-puberulent, with obtuse teeth; petals white, one and a half times as long as calyx; limb cleft to below the middle into oblong lobes, these terminated by rounded obtuse teeth; coronal scales broad-ovate, denticulate at apex, 1–1.5 mm long; claw enlarged and usually ciliate at summit; capsule ovoid, 8–10 mm long, about equaling the hairy carpophore; seeds reniform, black. July–August.

Alpine meadows, at altitudes between 2,400 and 3,000 m. — Caucasus: Gr. Cauc., Dag. Endemic. Described from Tufan-Dag (E. Caucasus). Type in Geneva; cotype in Leningrad.

112. *S. tatarica* Schischk. in Acta Inst. Botan. Ac. Sc. URSS, ser. 1, III (1936).

Perennial, densely crisp-pubescent throughout and at summit glandular; rootstock long, woody, branched, 1.5–2 mm thick, giving rise to short sterile shoots and flowering stems 5–15 cm long; leaves of sterile shoots lanceolate to ovate-lanceolate, tapering to a rather long and broad petiole, 1–2.5 cm long and 1.5–3.5 mm broad, acute, with softly ciliate margin; cauline leaves similar, sessile; flowers solitary or else 2 or 3 at tips of stems; pedicels 4–5 mm long; calyx cylindric-clavate, 15–20 mm long and 3–4 mm broad, glandular-pubescent; teeth ovate, obtuse, broadly scarious-margined; petals one and a half times as long as calyx; limb cleft to the middle into ovate lobes; coronal scales broad-ovate, obtuse, ca. 1 mm long; claw scarcely enlarged at summit, glabrous as are filaments; carpophore densely pubescent, ca. 10 mm long. July–August.

Alpine slopes. — Caucasus: S. Transc. (Zangezur Range between Yaglu-Dara and Ag-Yurt). Endemic. Described from the location indicated. Type in Baku; cotype in Leningrad.

669 113. *S. incurvifolia* Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 391; Ldb. Fl. Ross. I, 321; Kryl., Fl. Zap. Sib. V, 1054. — *S. depressa* Ldb. Fl. Alt. II (1830) 151, non M. B. nec Baumg. — *S. depressa* var. β Ldb. Fl. Ross. I (1842) 321 ex parte. — *S. supina* Ldb. Fl. Alt. II (1830) 151, non M. B.; Kryl., Fl. Alt. I, 148. — *S. repens* var. *macilenta* Bge. Suppl. Fl. Alt. (1836) 32. — *S. litigiosa* Schrenk in Bull. Phys. Mat. Acad. Pétersb. II (1844) 198. — *S. tarbaghataica* Kryl., Botanical material collected by G. N. Potanin in the Semipalatinsk Region (1891) 60.

Perennial, covered throughout with short retrorse appressed hairs, these usually interspersed in upper part with glandular hairs; rootstock stringlike, creeping; stems rather numerous, erect or ascending, 8–25 cm long; leaves linear-lanceolate to linear, acute, narrowing toward base, 2–5 cm long and 1–5 mm broad, the lower with axillary fascicles; flowers solitary or else 2 or 3 at tips of stems, on pedicels 2–30 mm long; bracts linear, herbaceous, 0.5–1.5 cm long; calyx cylindric-clavate, 2–2.5 cm long and 3 mm broad, covered with simple as well as glandular hairs; teeth ovate, obtuse, scarious-margined; petals whitish; limb cleft to the middle into oblong lobes; coronal scales obovate, crenulate; claw auriculate at summit; capsule ovoid to oblong-ovoid, 10–12 mm long, as long as the densely pubescent carpophore; seeds reniform, ca. 1.5 mm long, finely striate. June–July. (Plate XXXIX, Figure 1).

Stony and gravelly slopes, more rarely on sandy soil. — W. Siberia: Irt., Alt.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh. Endemic. Described from Ayaguz (N. E. Kazakhstan). Type in Leningrad.

114. *S. schafta* Gmel. jun. ex Hoh. Enum. Talysch (1838) 161; Fisch et Mey. Ind. V sem. Hort. Petropol. (1839) 41; Ldb. Fl. Ross. I, 323; Boiss. Fl. Or. I, 655; Rohrb. Monogr. 132. — Ic.: Fisch et Mey. Sert. Petropol. 2. Bot. reg. (1846) t. 20.

Perennial; taproot stout, multicapital; stems numerous, ascending, puberulent, 10–15 cm long; leaves ovate, 1–1.5 cm long and 5–8 mm broad, obtuse, ciliate-margined, with a very short petiole; flowers 1 or 2

at tips of stems and branches; pedicels shorter than to equaling calyx, pubescent; calyx long-cylindric, 18–22 mm long and ca. 4 mm broad, puberulent; teeth obtuse, with scarious ciliate margin; petals purple, twice as long as calyx; limb notched at apex; coronal scales ovate, to 1 mm long; claw auriculate at summit, glabrous; capsule ovoid, ca. 15 mm long; carpophore pubescent, as long as capsule; seeds sharply tuberculate. July–August.

Rocks in the subalpine zone, at altitudes between 1,500 and 1,800 m. — Caucasus: Talysh (Keridakhi Mtn., Kyz-Kalasi, Shindan-Kalasi, Boloband).

Gen. distr.: N. Iran. Described from Zuvant, Keridakhi Mtn. Type in Leningrad.

Series 6. **Gymnocarpophoreae** Schischk. — Carpophore glabrous; calyx large.

115. **S. kuschakewiczii** Rgl. et Schmalh. in A. H. P. V, 1 (1877) 246.

Perennial, scarcely woody at base; flowering stems numerous, ascending at base, then erect, 20–30 cm long, simple or slightly branched at summit, covered with short retrorse hairs; leaves lanceolate, acute, puberulent or more rarely glabrate, 3.5–5 cm long and 5–7 mm broad, the lower short-petioled, the upper sessile; flowers at tips of stems and branches in 3–5-flowered dichasia; pedicels short; bracts lanceolate, acute, covered, as are pedicels, with recurved hairs; calyx cylindric-clavate, 20–22 mm long and ca. 3 mm broad, covered with retrorse recurved hairs; teeth ovate, obtuse, scarious-margined; petals white; limb lobed to one-third or to the middle, the lower obtuse; coronal scales small; limb acutely auriculate; capsule ovoid, ca. 10 mm long; carpophore glabrous, 10–15 mm long; seeds reniform, grooved on the back, with concave faces. June–July. (Plate XXXIX, Figure 6).

Rocky slopes. — Centr. Asia: T. Sh. Endemic. Described from Kastek Pass. Type in Leningrad.

116. **S. pamirensis** (H. Winkl.) Preobr. in Acta Inst. Bot. Acad. Sc. URSS, ser. 1, II (1936) 151. — *S. caucasica* var. *pamirensis* H. Winkl. Stud. Veg. Pamir in Caryophyllaceae in As. central. a cl. O. Paulsen lectae (1920) 47. — Ic.: H. Winkl, l. c.

Perennial, strongly woody at base, with densely leafy and sometimes fairly long sterile shoots; flowering stems numerous, ascending at base, 5–30 cm long, covered with short stiffish retrorse hairs, sometimes glandular at summit, simple or with ascending branches; leaves of sterile shoots lanceolate to linear-lanceolate, 1–3 cm long and 1–5 mm broad, densely scabrous-pubescent, acute, tapering to a fairly long petiole, greatly exceeding the internodes, with short narrow-leaved axillary branchlets; cauline leaves much shorter than internodes, sessile; flowers at tips of stems and branches in dichasia or rarely solitary; bracts herbaceous resembling foliar leaves but only 4–6 mm long; calyx cylindric-clavate, 16–22 mm long, covered with short crisp hairs sometimes interspersed with glandular ones; teeth obtuse, scarious-margined, ciliolate, 2–3 mm long; petals white or roseate; limb lobed to one-third, the lobes oblong obtuse; coronal scales

short; claw auriculate at summit, glabrous; capsule ovoid, 8–10 mm long; carpophore glabrous, 6–10 mm long; seeds rounded-reniform, ca. 1 mm long, with striate faces, grooved on the back. June–August. (Plate XXXIX, Figure 3).

Stony and rocky slopes and around stones in the high-alpine zone. — Centr. Asia: Pam.-Al. (Pamir: Sassyk-Kul, Chatyr-Tau, Chukur Lake, Kara-Su River, Pamir River, Anachur Valley, Shakh-Dara, Yashimb-Kul; Shugnan: Khorog, Bartang River). Endemic. Described from around Yashimb-Kul Lake (var. *pamirensis* H. Winkl.). Type in Leningrad.

117. *S. karaczukuri* B. Fedtsch. in A. H. P. XXVIII (1909) 469; H. Winkl. in Caryophyllaceae in As. central. a cl. O. Paulsen lectae (1920) 47. — *S. pamirensis* Preobr. in Herb. Inst. Bot. Acad. Sc. URSS, ex parte.

Perennial, woody at base, with short densely leafy sterile shoots; flowering stems numerous, 5–10 cm long, minutely glandular-puberulent; radical leaves linear-lanceolate to linear, 0.5–1.5 (2.0) cm long and 0.5–1.5 mm broad, tapering to a fairly long petiole, acute to subobtusate, glabrous except for ciliate margin; cauline leaves 3 pairs, resembling the radical but shorter and sessile; flowers solitary; bracts herbaceous, lanceolate, 3–10 mm long; calyx tubular-cylindric, 15–20 mm long, covered with very short glandular hairs; teeth obtuse, scarious-margined, ca. 1 mm long; petals roseate or white; limb cleft to the middle into oblong obtuse lobes; coronal scales short; claw auriculate at summit, glabrous; capsule unknown. July–August. (Plate XXXIX, Figure 4).

Rocky slopes. — Centr. Asia: Pam. **Gen. distr.:** Chinese Pamir. Described from Tagdumbash-Pamir, where it was collected at confluence of Kara-Chukur and Ilyk-Su rivers. Type in Leningrad.

118. *S. meyeri* Fenzl in Kotschy, Pl. Pers. austr. ex Boiss. Fl. Or. I (1867) 523; Grossg., Fl. Kavk. II, 411. — *S. depressa* C. A. M. Verzeichn. Pfl. Cauc. (1831) 216, non M. B. — *S. depressa* var. γ Ldb. Fl. Ross. I (1842) 321. — *S. depressa* β *meyer*i Rohrb. Monogr. Silene 133, ex parte; Williams in Journ. Linn. Soc. XXXII (1896) 90.

672 Perennial, woody at base, with numerous congested puberulent herbaceous stems 2–7 cm long; cauline leaves spatulate-linear or lanceolate, 1.0–1.8 cm long and 1.5–4 mm broad, usually much longer than internodes, glabrous or puberulent, ciliate-margined, petiolate or sessile; flowers solitary at tips of stems, subtended by 2 pairs of terminal leaves; calyx glandular-roseate, about one and a half times as long as calyx; limb lobed to one-fifth, the lobes oblong; coronal scales lanceolate, acute, to 1.5 mm long; claw with large obtusely toothed auricles; capsule broad-ovoid, 5 mm long and 3.5 mm broad; carpophore glabrous, to 20 mm long; seeds reniform, muricate on the back, the faces striate. June–August.

Rocks in the alpine and subalpine zones. — Caucasus: S. Transc., Tal. **Gen. distr.:** Iran. Described from Talysh. Type in Leningrad.

119. *S. guntensis** B. Fedtsch. in Trud. Bot. Muz. Akad. Nauk v SPbI (1902) 119, nom. — *S. depressa* var. *guntensis* B. Fedtsch., l. c. (1902). —

* It is possible that this includes *S. turkestanica* Rgl. in A. H. P. II (1873) 436, which cannot be checked because of lack of the authentic specimen and inaccurate description.

S. depressa auct. Fl. Turk., non M. B. — *S. rupicola* M. Pop. in Schedis ad Herb. Inst. bot. Ac. Sc. URSS, non Boreau nec Huet.

Perennial; taproot stout, multicapital; stems numerous, slender, ascending at base, 15–30 cm long, densely leafy below, gray-puberulent as are the leaves; leaves linear to linear-lanceolate, acute, narrowing at base, 2–6 cm long and 0.5–4.5 mm broad; flowers solitary or in 3's; bracts herbaceous, long-acuminate from lanceolate base; pedicels 2–5 mm long; calyx cylindric-clavate, 25–35 mm long and 2–4 mm broad, covered with short glandular hairs; teeth obtuse, the scarious margin ciliate; petals white, one and a half times as long as calyx; limb cleft to the middle into oboval lobes; coronal scales obtuse; capsule ovoid, 6–8 mm long. June–August. (Plate XXXIX, Figure 2).

Rocks and stony slopes, at altitudes between 900 and 3,000 m. — Centr. Asia: W. T. Sh., Pam.-Al. **Gen. distr.:** Iran. Described from Shugnan, Gunt River valley. Type in Leningrad.

120. *S. araratica* Schischk. in Ber. d. Tomsk. Staatlich. Universität. B. 77, Lief. 3 (1927) 292; Grossg., Fl. Kavk. II, 411. — *S. vallesia* Ldb. Fl. Ross. I, 320, ex parte, non L. — *S. meyeri* f. *calycina* Lipsky in Sched.

Perennial; rootstock woody, stoutish, giving rise to flowering stems and short sterile shoots; stems ascending, ca. 10 cm long, covered with short glandular hairs; leaves spatulate, 15–25 mm long and 4–6 mm broad, short-acuminate, minutely glandular-puberulent, with ciliate margin; lower cauline and rosette leaves tapering to a fairly long petiole; median and upper cauline leaves sessile, equaling or scarcely exceeding internodes; flowers 1 or 2 on the stem, short-petioled; calyx cylindric, 25 mm long, glandular-hairy, with obtuse teeth; petals whitish (?); limb lobed to one-quarter or one-third, the divergent lobes rounded at apex; coronal scales obtuse, ca. 1.5 mm long; claw glabrous, auriculate at summit; capsule ovoid, 9–11 mm long; carpophore glabrous, 17–20 mm long; seeds reniform, grooved on the back, minutely tuberculate.

Caucasus: S. Transc. (Ilanlu-Dag Mtn.). **Gen. distr.:** Ararat. Described from Mt. Ararat. Type in Leningrad.

121. *S. korshinskyi* Schischk. sp. nova in Addenda V, p. 677.

Perennial; taproot stout, multicapital, giving rise to numerous sterile shoots forming a dense pulvinate mat; flowering stems few, glabrous in lower part, covered above with stoutish simple as well as glandular hairs or glandular throughout; leaves of sterile shoots linear to linear-lanceolate, acute, 1–3 cm long and 1.5–2.5 (3) mm broad, glabrous, sparsely ciliate, 1-veined; cauline leaves 3–5 pairs, resembling the radical but smaller, the lower glabrous, the upper pubescent like the stem; bracts herbaceous, lanceolate, inserted just below the flower; calyx cylindric-clavate, 23–27 mm long, densely covered with glandular hairs; petals whitish (?), one-third longer than calyx; limb cleft to the middle, the oblong lobes unequally rounded-toothed at apex; coronal scales to 2 mm long; capsule ovoid, 10 mm long; carpophore glabrous, 15 mm long. August–September.

Stony slopes in the alpine zone, at altitudes between 2,600 and 2,800 m. — Centr. Asia: T. Sh. Endemic. Described from mountain pass between Maili-Su and Kara-Kul. Type in Leningrad.

122. *S. nevskii* Schischk. in Acta Inst. Bot. Ac. Sc. URSS. Ser. 1, II (1936) 149. — Ic.: l. c., fig. 5.

Perennial; densely pulvinate, glandular-puberulent throughout; taproot stout, giving rise to short leafy sterile shoots and simple flowering stems 5–15 cm long; leaves narrowly linear, 0.7–2 cm long and 0.5–1 mm broad, acute, 1-veined, commonly recurved, the upper smaller; flowers solitary or paired on the stem; bracts herbaceous, lanceolate, ca. 3 mm long, acute; calyx cylindric, 25–28 mm long and ca. 3 mm broad, glandular-puberulent, purple-nerved; teeth obtuse, with broadly scarious ciliate margin; petals white, one and a half times as long as calyx; limb cleft to the middle into oblong lobes; capsule (immature) ovoid, 8–10 mm long; carpophore glabrous, ca. 18 mm long. July.

About the upper limit of savin woods. — Centr. Asia: Mtn. Turkm. (Kugitang Range, near Markushi village). Endemic. Described from the location indicated. Type in Leningrad.

674

123. *S. alpicola* Schischk. in Berichte der Tomsk. Staatlich Universität B. 77, Lief. 3 (1927) 291; Grossg., Fl. Kavk., 412.

Perennial; rootstock rather long, slender, giving rise to flowering stems and short leafy shoots; stems ascending, 6–10 cm long, covered with short retrorse hairs; leaves spatulate, the lower with petiole exceeding the blade, long-ciliate, the upper sessile, glabrous, with ciliolate margin; flowers 1–3 on the stem, borne on short glandular-pubescent pedicels; calyx cylindric-clavate, covered with short simple as well as glandular hairs, 18–20 mm long, the teeth obtuse; petals lurid; limb 6 mm long, lobed to one-third; coronal scales obtusish, to 1 mm long; claw glabrous, enlarged at summit; carpophore glabrous, 10 mm long. August.

Alpine slopes. — Caucasus: W. part of Main Range, near Kuban Region — mountains Bambak, Lokhmatyi Shikhan and Abago Range. Endemic. Described from Bambak Mountain. Type in Leningrad.

Section 12. **VIRIDIFLORAE** Boiss. Fl. Or. I (1867) 574, 633. — Nutantes Rohrb. Monogr. Silene (1868) 76. — Flowers perfect, in an often 1-sided panicle, nodding; calyx pubescent, with acutish teeth; claw scarcely enlarged at summit. Perennials.

124. *S. viridiflora* L. Sp. pl. ed. II (1762) 597; Ldb. Fl. Ross. I, 319; Boiss. Fl. Or. I, 634; Rohrb. Monogr. Silene 214; Williams in Journ. Linn. Soc. XXXII (1896) 169; Shmal'g., Fl. I, 140. — *S. catholica* Ldb., l. c., non Oth. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 293, fig. 5104.

Perennial; stems erect, 50–120 cm long, with often secund branches, villous-pubescent in lower part, glandular above; leaves oblong-elliptic, ovate, or spatulate, the lower 2–8 cm long and 1–3 cm broad, rather long-pedicelled, the upper smaller, sessile; flowers solitary or in 3's at tips of stems and branches; bracts herbaceous, 3–5 mm long; calyx cylindric, 13–17 mm long and 3–4 mm broad, glandular-pubescent, very slightly inflated, with lanceolate teeth; petals greenish, one and a half times to twice as long as calyx; limb cleft to the middle; coronal scales none; claw

glabrous, not enlarged at summit; capsule ca. 12 mm long, subsessile; seeds reniform, tuberculate, concave on the back. June.

Forest glades. — European part: Crim. Gen. distr.: Atl. Eur., W. Med., Balkan Peninsula. Described from Portugal. Type in London.

125. *S. nutans* L. Sp. pl. (1753) 413; Ldb. Fl. Ross. I, 318; Turcz. Fl. baic.-dahur. I, 208; Rohrb. Monogr. 216; Shmal'g., Fl. I, 133; Williams in Journ. Linn. Soc. XXXII (1896) 171; Kryl., Fl. Zap. Sib. V, 1070. — *S. nutantiformis* Simk. Magy. orvos és term. munk. XXIV (1907) 247. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 295. — Exs.: HFR no. 859.

675

Perennial; stems solitary or several, erect, 30–70 cm long, pubescent, commonly glandular at summit, with sterile leafy shoots at base; radical leaves spatulate, with petiole equaling or exceeding the blade and together with it 5–15 cm long, 0.7–1.5 cm broad, acute, covered on both surfaces with short hairs; cauline leaves 2–4 pairs, lanceolate, long-acuminate, puberulent, sometimes with axillary fascicles; flowers nodding, in a loose oblong 1-sided panicle; pedicels shorter than to slightly longer than calyx; calyx tubular, 8–12 mm long and 3–3.5 mm broad, glandular-pubescent or rarely glabrous as the whole plant (f. *glabra* Kryl.); teeth acute, scarious-margined; petals whitish, one and a half times to twice as long as calyx; limb parted to two-thirds into linear lobes; coronal scales linear to almost subulate, 2–3 mm long; claw glabrous, scarcely enlarged at summit; capsule ovoid, 8–10 mm long, four times as long as the puberulent carpophore. June – August.

Open woods. — European part: Lad.-Ilm., Dv.-Pech., U. Dnp., V.-Kama, M. Dnp., V.-Don, Bl., L. Don, Transv., Crim. (very rarely); Caucasus: Cisc., (Stavropol); W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Yeniss., Ang.: Say. Gen. distr.: N. and Centr. Eur., N. Bal. Described from N. Europe. Type in London.

Section 13. **ITALICAE** Rohrb. Monogr. (1868) 77, 218. — Calyx tubular, pubescent; coronal scales none. Perennials with large spatulate or elliptic leaves.

126. *S. italica* (L.) Pers. Synops. I (1805) 498; Ldb. Fl. Ross. I, 323. Boiss. Fl. Or. I, 631; Rohrb. Monogr. Sil. 218; Rupr. Fl. Cauc. (1868) 191; Williams in Journ. Linn. Soc. XXXII (1896) 174; Shmal'g., Fl. I, 140. — *Cucubalus italicus* L. Syst. ed. X (1749) 1030. — *Silene nemoralis* Ldb., l. c., 324; Alb. Prodr. Fl. Colch., non Waldst. et Kit. — Ic.: Rchb. Pl. Crit. III, t. 292.

Perennial; stem with sterile branchlets at base, 25–80 cm long, pubescent in lower part, viscid and branched above; radical leaves elliptic, 2–6 cm long and 0.5–2 cm broad, with petiole equaling the blade; cauline leaves smaller, spatulate, short-pedicel or sessile, covered on both surfaces with soft hairs, the margin ciliate; upper leaves linear-lanceolate; flowers at tips of stems and branches in 3-flowered dichasia, short-pedicel; calyx cylindric, 18–20 mm long, puberulent or glabrous (var. *lejocalycina* Rupr.); petals white, one and a half times to twice as long as calyx; limb cleft to below the middle into oblong lobes; coronal scales none; capsule

ca. 10 mm long; carpophore hairy, as long as capsule; seeds reniform, 1 mm long, finely tuberculate. May—July.

676 Stony and meadow slopes, coppices, open woods, and mountain pine groves. — European part: Caucasus: Cisc., Dag., E., S., and W. Transc., Tal.; Centr. Asia: Mtn. Turkm. **Gen. distr.:** W. and E. Med., Bal.-As. Min., Iran., N. Afr. Described from Italy. Type in London.

Section 14. **HOLOPETALAE** Schischk. — Petals entire; coronal scales none; calyx glabrous; inflorescence loose, racemose or paniculate.

Series 1. **Sibiricae** Schischk. — Plants with short densely leafy axillary branchlets; inflorescence a racemiform panicle.

127. **S. sibirica** (L.) Pers. Syn. I (1805) 497; Ldb. Fl. Ross. I, 310; Rohrb. Monogr. 202; Shmal'g., Fl. I, 142; Williams in Journ. Linn. Soc. XXXII (1896) 157; Kryl., Fl. Zap. Sib. V, 1065. — *Cucubalus sibiricus* L. Syst. ed. X, 2 (1769) 1031. — Exs.: HFR no. 2983.

Perennial; stems erect, 35–80 cm long, more or less branched, scabrous-puberulent; leaves linear-lanceolate to linear, 2–6 cm long and 2–6 mm broad, acute, puberulent or glabrate, with densely leafy axillary branchlets, these short or up to 15 cm long; flowers short-pedicelated, clustered in the axils of upper leaves and forming a racemiform inflorescence; bracts lanceolate, with scarious ciliate margin; calyx clavate, 5–8 mm long and 1.5 mm broad, somewhat accrescent in fruit, glabrous, more rarely scabrous, with ovate acutish teeth; petals yellowish-green, spatulate-oblong, entire or retuse; capsule ovoid, 6–8 mm long; carpophore glabrous, 2–3 mm long; seeds 1 mm long, finely striate, grooved on the back. June–August. (Plate XL, Figure 1).

Steppe meadows, steppes, and calcareous slopes. — European part: V.-Kama, V.-Don, Transv., L. Don, L. V.; W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from Siberia. Type in London.

128. **S. gebleriana** Schrenk, Enum. pl. nov. I (1841) 91; Ldb. Fl. Ross. I, 311; Rohrb. Monogr. 203; Williams in Journ. Linn. Soc. XXXII (1896) 157; Kryl., Fl. Zap. Sib. V, 1066.

677 Perennial, scabrous-puberulent throughout; stems erect, 50–80 cm long, profusely branched, densely leafy, with relatively narrow-leaved short sterile or sometimes elongated flowering axillary shoots; leaves lanceolate to lance-linear, 3.5–8 (12) cm long and 3–10 mm broad, acuminate or acute, narrowing toward base; flowers in a racemiform panicle; pedicels one-sixth to half as long as or almost equaling calyx; bracts ovate-lanceolate, with broadly scarious ciliate margin; calyx clavate-cylindric, 9–15 mm long and 2–2.5 mm broad, puberulent; teeth obtuse or obtusish, scarious-margined; petals whitish-green, rarely dark purple (var. *purpurea* Schischk.), one and a half times as long as calyx, oblong-obovate, entire, gradually narrowing to a glabrous exerted claw; capsule oblong-ovoid, 7–8 mm long; carpophore pubescent, 5 mm long; seeds reniform, ca. 1 mm long, grooved on the back. June–July. (Plate XL, Figure 2).

Solonetzes and solonetz meadows. — Centr. Asia: Ar.-Casp., Balkh., T. Sh., Kara K., Kyz. K. **Gen. distr.:** Kuldzhin district. Described from Urdzhar. Type in Leningrad.

129. **S. holopetala** Bge. in Ldb. Fl. Alt. II (1830) 142; Ldb. Fl. Ross. I, 311; Rohrb. Monogr. Silene, 201; Williams in Journ. Linn. Soc. XXXII (1896) 157. — Ic.: Ldb. Ic. pl. Fl. Ross. II, t. 163.

Perennial, woody at base; stems numerous, erect, 30–80 cm long, simple or branched; leaves lance-linear to linear, 1–3 cm long and 1.5–3 mm broad, acute, narrowing toward base, with leafy sterile axillary branchlets; flowers dimorphous, perfect and female, in few-flowered whorls forming a racemiform inflorescence, pedicels 2–6 (10) mm long; bracts small, broad-ovate, with scarious ciliate margin; calyx cylindric or clavate, 6–9 mm long and 2–2.5 mm broad, hirtellus or subglabrous; teeth obtuse, 1–1.5 mm long; petals with whitish inner and roseate outer face, oblong-elliptic, entire; capsule ovoid, 6–8 mm long; carpophore glabrous, ca. 2 mm long; seeds reniform, finely tuberculate. June — July.

Stony and desert slopes, and solonetz steppes. — Centr. Asia: Balkh., Dzu.-Tarb. Endemic. Described from Dzhungaria. Type in Leningrad.

130. **S. scabrifolia** Kom. in Trav. Soc. Nat. Pétersb. Botan. XXVI (1896) 129.

678 Perennial; taproot stout; stems several, erect or at the very base ascending, 60–90 cm long, simple or branched, scabrous-puberulent in lower part, glabrous and viscid above; lower leaves marcescent; median cauline leaves ovate, 5–8 cm long and 1–3 cm broad, scabrous-pubescent, ciliolate, acute, narrowing toward base or very briefly petiolate, with short sterile axillary shoots, these with smaller leaves; flowers in a slender racemiform panicle; pedicels glabrous, 5–10 mm long; bracts lance-subulate, 3–5 mm long, herbaceous, with scarious ciliate margin; calyx cylindric-clavate, 8–9 mm long, glabrous; teeth short, triangular, acutish; petals one and a half times to twice as long as calyx, whitish-carneous when dry; limb scarcely emarginate, narrowly obovate; capsule broad-ovoid, rupturing the calyx, 8 mm long and 5 mm broad; carpophore puberulent, 2–3 mm long. June — August.

Stony slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Zeravshan (Kshtut and Iovon). Type in Leningrad.

131. **S. komarovii** Schischk. nom. nov. — **S. viscidula** Kom. in Trav. Soc. Nat. Pétersb. XXVI (1896) 129, non Franch. (1886).

Perennial; stems several, 50–70 cm long, erect, scabrous-pubescent in lower part, glabrous and viscid above; radical leaves spatulate or lanceolate, 6–8 cm long and 0.5–1 cm broad, with rough-ciliolate margin, acute or acuminate, tapering to fairly long petiole; cauline leaves lanceolate to lance-linear, with short sterile axillary branchlets; flowers in a slender racemiform panicle; pedicels glabrous, 5–10 mm long; bracts lanceolate, acute, scarious; calyx cylindric-clavate, 8–12 mm long and 2–3 mm broad, glabrous; teeth triangular, acute, scarious-margined; petals lurid, one and a half times as long as calyx; limb very slightly notched; claw and stamens glabrous; capsule ovoid, 6–9 mm long; carpophore glabrous or scarcely pubescent, 2–3 mm long; seeds reniform, 1.25 mm long. June — August.

Stony slopes, savin and maple thickets, and among dog-rose shrubs. — Centr. Asia: Syr D., Pam.-Al., T. Sh. (W.). Endemic. Described from Zeravshan (Iovon village). Type in Leningrad.

Series 2. **Pseudotenues** Schischk. — Axillary sterile shoots or fascicles none; flowers in a racemose-paniculate inflorescence.

132. **S. pseudotenueis** Schischk. in Not. Syst. ex Herb. Horti Bot. Petrop. VI, 3 (1926) 6. — **S. trajectoryrum** var. **schischkini** et var. **pseudotenueis** M. Pop. in Sched. ad H. F. A. M. in Acta Univers. As. Med. ser. VIII b, Fasc. 3 (1928) 99. — Exs.: H. F. A. M. no. 472.

Perennial; rootstock stout; stems several, erect, simple or slightly branched, sometimes woody at base (var. **Schischkini** M. Pop.), 15–50 cm long, covered in lower part with short retrorse hairs, very rarely glabrate, viscid in upper part; radical leaves numerous, spatulate-lanceolate to lanceolate, 2–8 cm long and 0.4–1 cm broad, acute to subobtusely, tapering to a fairly long petiole; cauline leaves 1–4 pairs, shorter, linear-lanceolate, ciliate; flowers in an elongate racemiform inflorescence; pedicels 5–13 mm long; calyx broadly campanulate, 5–7 mm long, glabrous, sometimes purple-tinged; teeth short, obtuse, scarious, ciliate; petals lurid or carneous, rounded at apex or retuse, one and a half times as long as calyx; claw enlarged at summit, glabrous or sparingly ciliate at base; filaments glabrous; capsule ovoid, 5–6 mm long; carpophore puberulent, 2–3 mm long. June–July. (Plate XL, Figure 4).

Stony mountain slopes and mountain steppes. — Centr. Asia: T. Sh. Endemic. Described from Tien Shan. Type in Tomsk; cotype in Leningrad.

133. **S. trajectoryrum** Kom. in Trav. Soc. Nat. Pétersb. Botan. XXVI (1896) 128.

Perennial; taproot stout, with numerous short sterile shoots terminating in tufts of leaves; flowering stems erect, glabrous, 15–25 cm long; radical leaves linear, 4–6 cm long and 1–3 mm broad, acuminate, narrowing toward base, ciliate; cauline leaves 2–4 pairs, similar but smaller; inflorescence a racemiform panicle; bracts scarious, broadly lanceolate, subulate-pointed; pedicels filiform, 5–20 mm long; calyx campanulate, 6–9 mm long and ca. 3–5 mm broad, glabrous, with triangular obtuse teeth; petals whitish; limb linear-oblong, entire or scarcely notched; claw glabrous; capsule oblong-ovaloid, three times as long as the minutely puberulent carpophore. July–August. (Plate XL, Figure 5).

Stony slopes in the alpine zone and moraines, at altitudes between 2,500 and 2,900 m. — Centr. Asia: Pam.-Al. Endemic. Described from Zeravshan (Kalla-Khan, Gudun Pass). Type in Leningrad.

134. **S. bobrovii** Schischk. sp. nova in Addenda V, p. 677.

Perennial; taproot stout, multicapital; stems numerous, ascending at base, 15–25 cm long, glabrous, commonly viscid; radical leaves lanceolate, 2–3 cm long and 3–5 mm broad, gradually tapering to petiole about the length of blade; cauline leaves sessile, glabrous, the margin obsoletely ciliate; flowers 3–5, remote, forming a loose raceme; pedicels 2–20 mm long, often deflexed; calyx narrowly campanulate, 8 mm long and 2–3 mm broad, glabrous; teeth short, triangular, acutish; petals buff (when dry), oblong,

entire, rounded at apex, about twice as long as calyx; claw and filaments glabrous; capsule ovoid, 8 mm long; carpophore glabrous, 4 mm long; seeds triangular-reniform, grooved on the back, almost smooth. August.

Dry silty slopes at an altitude of about 2,600 m. — Centr. Asia: Pam.-Al. (Kugitang). Endemic. Described from the environs of Kugitang. Type in Leningrad.

★135. *S. kungessana* B. Fedtsch. in Allg. Bot. Zeitschr. XIV (1908) 2; Cons. Fl. Turkest. II (1909) 122.

680 Perennial, markedly glabrous throughout; stems several, erect, 80–100 cm long; leaves ovate-lanceolate, 5–7 mm long (excluding petiole) and 1.5–3 cm broad, acuminate, thin, abruptly narrowing to petiole 2–5 cm long; inflorescence a slender panicle or raceme; bracts very small, lanceolate; pedicels 6–10 mm long; calyx cylindric, 6–8 mm long and 2–3 mm broad, glabrous, with triangular acute teeth; petals white, slightly notched; capsule ovoid, 7 mm long; carpophore 1–2 mm long; seeds triangular-reniform, punctate.

Not found in the USSR. Occurring in adjacent parts of China (Sinkiang Province: Kunges). Endemic. Described from Kunges. Type in Leningrad.

136. *S. schugnanica* B. Fedtsch. in Trav. Musée bot. Ac. Sc. St. Pétersb. I (1902) 119.

Perennial, strongly woody at base; stems 40–90 cm long, simple or branched, glabrous, viscid, clothed at base with remnants of dead leaves; leaves crowded on the lower part of the stem, spatulate, 3–4 cm long and 5–10 mm broad, thickish, obtuse, long-petioled; median cauline leaves ovate, 2.5–7 cm long and 1.5–3 cm broad, acuminate or obtuse and mucronulate, short-petioled or sessile, glabrous, the margin closely beset with small cartilaginous teeth; inflorescence a narrow panicle; pedicels glabrous, 8–18 mm long; bracts lanceolate, herbaceous, the narrow scarious margin ciliate; calyx cylindric-clavate, 7–12 mm long; teeth very small, triangular, acutish; petals white, one and a half times as long as calyx; limb broadly linear; coronal scales none; capsule broad-ovoid, to 9 mm long; carpophore glabrous, 2–3 mm long; seeds reniform, ca. 1 mm long, finely punctulate. June–August.

Stony mountain slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Shugnan (Rivak-Vankasha). Type in Leningrad.

137. *S. obovata* Schischk. in Acta Inst. Bot. Acad. Sc. URSS Ser. 1, II, (1936) 141. — *S. praemixta* var. *rupestris* M. Pop. in Sched ad Herb. Ac. URSS.

Perennial; taproot stout; plant glabrous throughout; stems numerous, 50–65 cm long, slightly branched in inflorescence, the woody base densely clothed with remnants of dead petioles; lower cauline leaves ovate or obovate, the blade ca. 3 cm long and 1–1.3 cm broad, acute or short-acuminate, gradually tapering to petiole 3–6 cm long; inflorescence a long loose racemiform panicle; flowers ascending or nodding; pedicels 2–6 mm long; bracts ovate-lanceolate, acuminate, broadly scarious-margined, ciliate; calyx cylindric-clavate, 8–10 mm long, glabrous; teeth short, triangular, acutish; petals yellowish-green, one and a half times as long as

681 calyx; limb oblong-cuneate, entire; claw and filaments glabrous; capsule broad-ovoid, 8 mm long and ca. 5 mm broad, rupturing the calyx; carpophore glabrous, 2–3.5 mm long. August.

Rocks. — Centr. Asia: W. T. Sh. (Verkhnyaya Sayas Ispai). Endemic. Described from the location indicated. Type in Leningrad.

Section 15. **CAPITELLATAE** Schischk. — Flowers in a capitate inflorescence enveloped by large ovate bracts; petals white, entire; coronal scales none; capsule subsessile.

138. **S. capitellata** Boiss. Diagn. ser. I, 1 (1842) 25; Fl. Or. I, 608 Rohrb. Monogr. 199; Williams in Journ. Linn. Soc. XXXII (1896) 154; Grossg., Fl. Kavk. II, 405.

Perennial, densely puberulent in lower part, glabrous and viscid above; stems erect, simple, 10–40 cm long; leaves lance-linear, the lower puberulent, long-petioled, to 5 cm long including petiole, ca. 5 mm broad, the upper linear, sessile; flowers on very short pedicels; inflorescence a dense broad-ovoid spherical terminal head, 9–15 mm long and ca. 9 mm broad, subtended by a pair of rather large ovate bracts, these sparsely covered with short hairs, scarious-margined; bracteoles almost wholly scarious, glabrous, ca. 6 mm long; calyx campanulate, pale green, sometimes violet-tinged at summit, with 10 green nerves; teeth rounded, broadly scarious-margined; petals white, entire, one and a half times as long as calyx; coronal scales none; claw ciliate; filaments glabrous or ciliate. June–July.

Steppe slopes. — Not found in the USSR, but occurring in adjacent parts of Turkey (Sarykamysh and near Promezhutochnoe in the Kars Region). **Gen. distr.:** As. Min., Arm.-Kurd. Described from Armenia. Type in Geneva.

Section 16. **RIGIDULAE** Boiss. Fl. Or. I (1867) 561, 601. — Calyx cylindric, glabrous, with subulate teeth; pedicels long, filiform; seeds wingless. Annuals.

139. **S. chaetodonta** Boiss. Diagn. I, 1 (1842) 39; Boiss. Fl. Or. I, 606; Rohrb. Monogr. Silene, 162. — *S. modesta* Boiss. et Bal. in Boiss. Diagn. II 6 (1859) 33; Williams in Journ. Linn. Soc. XXXII (1896) 122. — *S. debilis* Stapf. in Denkschr. Acad. Wien. (1886) 282.

682 Annual; stems 20–40 cm long, simple or branched, hirsute in lower part, glabrous and viscid above; leaves linear, 3–4 cm long and 1–3 mm broad, scabrous-puberulent, ciliate, with axillary fascicles; flowers at tips of stems and branches; pedicels erect, 1–3.5 cm long; bracts similar but smaller; calyx cylindric-clavate, 12–15 mm long, glabrous, with 10 very prominent nerves, whitish-scarious between the nerves; teeth 5–6 mm long, subulate, ciliate; petals pink, scarcely longer than calyx; limb cleft to the middle into oblong lobes; coronal scales lanceolate, 0.5 mm long, acute; claw glabrous; capsule ovoid, 7–8 mm long, two-fifths to half as long as the puberulent carpophore; seeds reniform, 1 mm long, grooved on the back, finely striate. May–June. (Plate XLI, Figure 4).



PLATE XLI. 1. *Silene cyri* Schischk.: staminate inflorescence; fruiting inflorescence, staminate flower.—
 2. *S. nana* Kar. et Kir.: fruit, seed. — 3. *S. arenosa* C. Koch. — 4. *S. chaetodonta* Boiss.: fruit.

Gravelly mountain slopes and riverside pebbles. — Centr. Asia: Mtn. Turkm. (Vannovskoe, Chuli, Firyuza, Nevtonovka, Pul-i-Khatum). **Gen. distr.:** Iran, Mesopotamia, Syria. Described from S. Iran. Type in Geneva.

140. *S. arenosa* C. Koch in Linnaea XV (1841) 711; Ldb. Fl. Ross. I, 778; Rohrb. Monogr. Silene 161; Williams in Journ. Linn. Soc. XXXII (1896) 122. — *S. leysseroides* Boiss. Diagn. I, 1 (1842) 41; Fl. Or. I, 603. — *S. salsa* Boiss. Diagn. I, 8 (1849) 77. — *S. kowalenskyi* Stschegl. in Bull. Soc. Nat. Mosc. (1853) 322. — Ic.: Stschegl., l. c. (1853), t. V.

Biennial, smooth, more or less viscid, glaucous, branched from base, 10–25 cm high; leaves narrowly linear, 2–4 cm long and 0.5–2(4) mm broad, acute; flowers solitary at tips of stem and branches; pedicels thrice to four times as long as calyx; bracts herbaceous, linear-lanceolate, acute, with scarious ciliate margin; calyx tubular, smooth, 10 mm long and ca. 2 mm broad; teeth subulate, acute, with white membranous ciliate margin; petals white, more rarely roseate, one and a half times as long as calyx; limb lobed to one-third; coronal scales very small; claw glabrous; capsule ovoid, 7 mm long and 3 mm broad; carpophore glabrous, 3–4 mm long; seeds very small, 0.5–0.75 mm long, deeply grooved on the back, the faces bluntly tuberculate. May. (Plate XLI, Figure 3).

Sands. — Caucasus: **S. Transc. Gen. distr.:** Arm.-Kurd., Mesopotamia, Iran., Ind.-Him. (Peshawar). Described from the Araks River valley (Transcaucasia). Type in Berlin.

Section 17. **SAPONARIOIDEAE** Boiss. Fl. Or. I (1867) 568, 581. — Calyx inflated in fruit, glabrous, with triangular acutish teeth, seeds winged. Annuals.

141. *S. nana* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 169; Ldb. Fl. Ross. I, 777; Rohrb. Monogr. Silene L., 157; Williams in Journ. Linn. Soc. XXXII (1896) 117.

685 Annual; stem simple or branched from base, glabrous, 3–15 cm long; branches patulous-ascending to almost horizontally spreading; leaves lance-linear to lanceolate, 2–3.5 cm long and 2–6 mm broad, acute to subobtuse, narrowing toward base, sessile, the margin beset with long soft crisp hairs; flowers 3–10 on the stem, rarely solitary; axillary or terminal, subpatulous at anthesis, deflexed or recurved in fruit; pedicels twice to thrice as long as calyx; bracts herbaceous, resembling foliar leaves but smaller; calyx ovoid, 10–11 mm long and ca. 5 mm broad, glabrous; teeth triangular, acutish, narrowly membranous-margined, ciliate; petals white, scarcely exceeding calyx; limb entire; coronal scales ovate, 1 mm long; claw auriculate at summit, glabrous; capsule ovoid, 1–2 mm long, the length of the glabrous carpophore; seeds large, 2 mm in diameter, rounded-reniform, wing-margined, finely striate. April–May. (Plate XLI, Figure 2).

Hummocky sands and sandy plains. — Centr. Asia: Balkh., Kyz. K., Kara K. **Gen. distr.:** Iran., Beluchistan. Described from Sassyk-Pastau (Kazakstan). Type in Moscow; cotype in Leningrad.

Subgenus 3. **OTITES** (Adans.) Schischk. — Gen. *Otites* Adans. Fam. II (1763) 255. — Sect. *Otites* Otth in DC. Prodr. I (1824) 369. — *Otiteae* Boiss. Fl. Or. I (1867) 571; Rohrb. Monogr. *Silene* (1868) 75, 199. — Flowers small; plants mostly dioecious* or monoecious-polygamous; calyx campanulate, 10-nerved; fruiting calyx tightly enclosing the capsule; petals entire or very slightly retuse; carpophore very short; inflorescence verticillate-paniculate. Biennial plants.

Series 1. *Wolgenses* Schischk. — Pedicels and calyx glabrous; capsule 4–6 mm long.

142. *S. wolgensis* (Willd.) Bess. ex Spreng. Ind. sem. Hort. Halens. (1818) 7; Otth in DC. Prodr. I (1824) 370; Boiss. Fl. Or. I, 607; Shishk. in Fl. Yugo-Vost. IV, 290; Kryl., Fl. Zap. Sib. V, 1063; Grossg., Fl. Kavk. II, 405. — *Cucubalus wolgensis* Willd. Enum. Hort. Berol. Suppl. (1813) 24, nom. nud. — *Viscago wolgensis* Hornem. Hort. Hafn. (1813) 48. — *S. otites* var. α Ldb. Fl. Ross. I, 309, ex parte. — *S. otites* γ *wolgensis* Rohrb. Monogr. *Silene* (1868) 201. — *S. otites* subsp. β *wolgensis* Schmalh., Fl. I (1895) 343. — Exs.: H. F. A. M. no. 123.

686 Biennial; stem in lower part pubescent, as are the leaves, glabrous and sometimes viscid above, branched in inflorescence, the opposite branches subpatulous; radical and lower cauline leaves spatulate, petiolate, 8 cm long including petiole, 10 mm broad; other cauline leaves lance-linear, leaves of axillary fascicles linear; inflorescence a loose panicle composed of rather loose clusters; pedicels filiform, glabrous, usually twice to thrice as long as calyx, rarely shorter; calyx campanulate, 2–3.5 mm long, glabrous, with obtuse teeth; petals whitish, one and a half times to twice as long as calyx, spatulate-linear, entire; filaments glabrous; capsule sessile, broad-ovoid, 4–6 mm long; seeds reniform, sharply tuberculate, 0.9 mm long. June–August.

Meadows, steppes, turf slopes, open woods, and sandy places. — European part: U. Dnp., M. Dnp., U. V., V. Kama, L. Don, L. V., Transv., Bl., Crim. (?); Caucasus: Cisc.: W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Dau.: Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh. Gen. distr.: Centr. Eur., Atl. Eur. (introduced) Dzu.-Kash., Bal. Described from the Volga. Type in Berlin.

143. *S. densiflora* D'Urv. in Mém. Soc. Linn. Paris I (1822) 303; Boiss. Fl. Or. I, 607, ex parte; Zapal. Consp. Fl. Galic, critic. III (1911) 187. — *S. chersonensis* Kleop. in Bull. Jard. bot. Kieff IX (1929) 9, ex parte. — *S. otites* δ *densiflora* Otth in DC. Prodr. I (1824) 369; Rohrb. Monogr. *Silene*, 201.

Biennial; stem to 1 m long, covered in lower half with somewhat crisp soft hairs, sometimes viscid above, branched in inflorescence; basal leaves numerous, approximate, spatulate, long-petioled, 8 cm long including petiole, 1–1.5 cm broad; lower cauline leaves lance-oblong-acute, gradually tapering to a short broad petiole; median leaves 4 cm long and 1–1.5 cm broad, both surfaces covered with patulous slightly crisped hairs; leaves of axillary fascicles smaller, narrow; flowers in clusters of 20–60 on the stem and on the ascending inflorescence branches; pedicels filiform,

* Staminate plants often differ markedly from the pistillate in their vegetative parts; identification of incomplete plants is therefore difficult and liable to be wrong. The sexual dimorphism of this subgenus has not yet been sufficiently investigated.

equalling or one and a half times to twice as long as calyx; bracts crowded at the base of pedicels, broad-ovate, acute, membranous, with long-ciliate margin; calyx 3–3.5 mm long and 1–1.2 mm broad, glabrous; teeth 5, obtusish, membranous-margined; fruiting calyx tightly enclosing the capsule; petals whitish, 6 mm long, narrowly spatulate, entire; coronal scales none; capsule sessile or borne on a very short carpophore, ovoid, 5–6.5 mm long and 3–4 mm broad; seeds small, reniform, to 1 mm long, striate, deeply concave on the back. May–June.

Stoney slopes, and sandy or stony steppes. — European part: Bl., L. Don, Crim.; Caucasus: W. Transc. (Novorossisk). **Gen. distr.:** N. Bl., As. Min. (Trapezund). Described from the environs of Kerch (Crimea). Type in Paris.

144. *S. pseudotites* Bess. ex Rchb. Fl. Germ. exc. (1832) 819. — *S. otites* 687 *γ macrophylla* Otth in DC. Prodr. I (1824) 369. — *S. otites* var. *pseudo-otites* Borb. Budapest és Kornyék növen (1879) 148. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 290, f. 5058. — Exs.: Fl. exs. Reipubl. Bog.-Slov. no. 21.

Biennial; stem 40–60 cm long, branched in inflorescence, minutely puberulent in lower part, glabrous above; branches ascending; radical leaves spatulate, long-petioled, 4–6 cm long and 5–12 mm broad, obtuse or mucronulate, finely velvety-pubescent and with long patulous hairs; cauline leaves similar but often narrower, spatulate-linear, short-petioled; leaves of axillary fascicles small; flowers in 3–6-flowered clusters forming a narrowly pyramidal panicle with ascending branches; pedicels slender, glabrous, 4–10 mm long; calyx campanulate, 2.5–3.5 mm long, glabrous; petals yellowish-green, one and a half times as long as calyx; capsule ovoid, 4 mm long. June–August.

Steppe meadows and meadow slopes. — European part: M. Dnp. (W.). **Gen. distr.:** Centr. Eur. Described from Germany (Wassowitz). Type in Berlin.

145. *S. baschkirorum* Janisch. in Berichte Saratow. Naturforschges. III, 1 (1929) 33. — Ic.: Janisch., l. c., tab. I, f. 1, 2, 3; tab. II, f. 6, 7c, 9c.

Biennial; stem 10–60 cm long, often branched from base, crisp-puberulent in lower part, glabrous above; radical and lower cauline leaves puberulent, spatulate, petiolate, 2–4 cm long including petiole, 2–4 mm broad; median and upper cauline leaves linear-spatulate, smaller and narrower, sometimes with axillary fascicles; inflorescence a lax panicle or sometimes a raceme; calyx campanulate, 3–4 mm long and 1–1.5 mm broad, glabrous; teeth obtuse, narrowly scarious-margined; petals with white inner and greenish outer surface, one and a half times as long as calyx, spatulate, entire, with glabrous claw; filaments glabrous; capsule ellipsoid, 5–7 mm long and 3.5–4 mm broad; carpophore glabrous, ca. 1 mm long; seeds reniform, tuberculate, 0.9 mm long. June.

Stony, often calcareous slopes, and marl bluffs. — European part: V.-Don, L. Don, Transv. Endemic. Described from Buzuluk. Type in Saratov.

146. *S. polaris* Kleop. sp. nova in Addenda V, p. 678.

Biennial; stems several, rarely solitary, 25–50 cm long, scabrous-pubescent at base, glabrous elsewhere, simple or branched from base;

radical leaves ovate, short-petioled, 3–5 cm long including petiole, 8–12 mm broad, glabrous or minutely scabrous-puberulent; cauline leaves linear-oblong, to 4 cm long and 1.5–6 mm broad, commonly glabrous, with axillary fascicles; flowers in loose few-flowered clusters forming a racemose-paniculate inflorescence; pedicels filiform, 3–10 mm long, glabrous; calyx campanulate, 3–3.5 mm long, with obtuse teeth; petals linear-cuneate, one and a half times to twice as long as calyx; stamens exserted; capsule ovoid, 4–5 mm long and 2.5 mm broad; carpophore 1–2 mm long; seeds reniform, 1 mm long, minutely and bluntly tuberculate on the back. June–August.

Waterside sands and pebbles, calcareous rocks, and argillaceous calcareous taluses. — Arctic: Arc. Eur., Arc. Sib.: European part: Lad.-Ilm. (Khibin ?); Dv.-pech., N. Ural; W. Siberia: Ob, Yen., Ang.-Say. Endemic. Described from the Mezen and Pinega rivers. Type in Leningrad.

Series 2. *Macrocarpae* Schischk. — Capsule 6–9 mm long.

147. *S. hellmanni* Claus in Beitr. Pflanzenk. Russ. Reich. VIII (1851) 289; Rohrb. Monogr. *Silene* 183; Shishkin in Fl. Yugo-Vost. IV, 290. — *S. ottites* var. *hellmanni* Trautv. in A. H. P. II, 2 (1873) 508. — *S. otites* subsp. δ *hellmanni* Schmalh., Fl. I (1895) 143.

Biennial; stem erect, ascending at base, unbranched, 20–40 cm long, densely puberulent as are the leaves, the upper internodes viscid; radical and lower cauline leaves obovate-spatulate, 2–7.5 cm long and 3–15 mm broad, short-acuminate, long-petioled; upper leaves narrower, sublinear; flowers in few-flowered cymes forming a slender racemiform panicle; pedicels densely puberulent, 5–7 mm long; calyx campanulate, 3.5–5 mm long, densely pubescent, with obtuse teeth; petals lurid, 5–7(8) mm long, sessile; seeds reniform, 0.5 mm long. May–June.

Chalk and granite outcrops. — European part: L. Don, Transv., L. V., Bl. Endemic. Described from Belaya Glinka. (L. Don). Type in Leningrad.

148. *S. cyri* Schischk. in A. Grossh., D. Sosnow. et B. Schischk. Fl. Tphilis. I (1925) 202 et in Berichte d. Tomsk. Staatl. Univers. 77, 3 (1927) 290. — *S. turcomanica* Kleop. in Sched. ad. Herb. Inst. bot. Ac. Sc. URSS. — Exs.: HFR no. 2855; Herb. Fl. cauc. no. 515.

Biennial; stem erect or at base ascending, 30–70 cm long, puberulent in lower half nearly to the inflorescence, as are the leaves, in inflorescence glabrous, simple or slightly branched; lower leaves spatulate-linear to spatulate, 5–10 cm long and 5–15 mm broad, acute to subobtuse, petiolate; cauline leaves similar but smaller, 4–6 cm long and 3–10 mm broad; bracts scarious, with ciliate margin; plants dioecious; flowers in 6–30-flowered clusters forming a racemose inflorescence; pedicels glabrous, 7–12 mm long; calyx campanulate, 3.5–4 mm long, glabrous or very slightly scaberulous, with obtuse scarious-margined teeth; petals greenish-yellow, spatulate, 5–6 mm long, entire; coronal scales none; claw pubescent; filaments hairy; capsule ovoid, 7–9 mm long and 4 mm broad, sessile; seeds reniform, ca. 1 mm long. May–June. (Plate XLI, Figure 1).

Stony slopes and dry steppes. — European part: L. V. (Astrakhan); Caucasus: Dag., E. Cisc., E. and S. Transc., Tal.: Centr. Asia: Ar.-Casp., Mtn. Turkm. Endemic. Described from the vicinity of Tbilisi. Type in Tbilisi; cotype in Leningrad.

149. *S. parviflora* (Ehrh.) Pers. Syn. I (1805) 497; Boiss. Fl. Or. I, 607; Shishk. in Fl. Yugo-Vost. IV, 289; Kryl., Fl. Zap. Sib. V, 1062. — *Cucubalus parviflorus* Ehrh. Beitr. VII (1792) 143, non Lam. — *S. otites* β Ldb. Fl. Ross. I (1842) 310. — *S. otites* β *parviflora* Rohrb. Monogr. *Silene* (1868) 200. — *S. otites* subsp. γ *parviflora* Schmalh., Fl. I (1895) 143. — Ic.: Rchb. Ic. Fl. Germ. VI, tab. 290.

Biennial, scabrous-puberulent throughout; stem simple or sometimes branched in inflorescence, 30–50 cm long; radical leaves linear-spatulate, 2.5–7 cm long and 2–7(10) mm broad; cauline leaves narrower; leaves of axillary fascicles shorter; flowers in a rather loose slender racemiform panicle; pedicels puberulent, equaling to twice as long as calyx; calyx scabrous-pubescent, 2–2.5 mm long, with acute teeth; petals whitish, slightly exceeding or one and a half times to twice as long as calyx, entire; coronal scales none; claw enlarged at summit, ciliate; filaments pubescent; capsule sessile, subglobose, ca. 3 mm in diameter; seeds reniform, ca. 1 mm long, smooth. June–September.

Gravelly slopes, pine woods and their margins, and sandy meadows. — European part: Lad.-Ilm. (Leningrad), U. Dnp., U. V., V.-Kama, Transv. Bl., L. Don, L. V., Crim. (Kerch Peninsula); Caucasus: Cisc., W. Siberia: U. Tob., Irt.; E. Siberia: Ang.-Say.; Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: N. Balkh., Dzu.-Tarb. (Chernyi Irtysh). Described from Hungary (?).

150. *S. media* (Litw.) Kleop. in Bull. Jard. bot. Kieff (1929) 64. — *S. parviflora* var. *media* Litw. in Sched. ad Herb. Fl. Ross. IV (1902) 3. — *S. parviflora* var. *glabriuscula* M. Pop. in Trav. Univers. As. Med. IX, Suppl. (1925) 39 in adnot. ad *S. volgensis* (Willd.) Bess. — Exs.: HFR no. 910.

690 Biennial; stems several, 20–45 cm long, simple or branched, glabrous, in lower part minutely scaberulous and faintly violet-tinged; leaves linear-oblong to lanceolate, tapering to a fairly long petiole and together with it 2–4.5 cm long, 1–4 mm broad, acute, glabrous, ciliolate at base of petiole, commonly with axillary fascicles; flowers in rather loose clusters forming a racemiform or narrowly pyramidal panicle; pedicels glabrous, 3–5 mm long; calyx campanulate, 2–2.5 mm long, glabrous, with short obtuse teeth; petals whitish, about as long as calyx, glabrous; filaments glabrous; capsule globose, sessile, 2–3 mm in diameter; seeds reniform, smooth, ca. 1 mm long. May–June.

Sands. — European part: Bl., L. Don, L. V.; W. Siberia: Irt. (?); Centr. Asia: Ar.-Casp. Endemic. Described from the environs of Dnepropetrovsk. Type in Leningrad.

Subgenus 4. **CONOSILENE** (Rohrb.) Williams in Journ. of Linn. Soc. XXXII (1896) 25. — Sect. *Coniomorpha* Oth in DC. Prodr. I (1824) 371. — *Coniomorphae* Boiss. Fl. Or. I (1867) 568. — *Conosilene* Rohrb. Monogr. d. Gattung *Silene* (1868) 89. — Calyx nerves 20–30, not anastomosing; fruiting calyx more inflated in lower part, constricted at summit. Annuals.

151. *S. conica* L. Sp. pl. (1753) 418; Ldb. Fl. Ross. I, 314; Boiss. Fl. Or. I, 578; Shmal'g., Fl. I, 136. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 275; Hegi Illustr. Fl. Mit. Eur. III, p. 218. — Exs.: HFR no. 2975.

Annual; taproot long and slender; stems solitary to several, 6–25(40) cm long, with remnants of dead leaves at base, simple or slightly branched, covered as are the leaves, with short soft hairs; leaves lance-linear, 2–4 cm long and 2–7 mm broad, acute to subobtusely, 3–5-veined; flowers solitary or several, on pedicels 2–26 mm long; bracts abruptly attenuate from ovate base, herbaceous, 3–5-nerved, ciliate; calyx tubular-conic, 10–15 mm long, 30-nerved, hispidulous, very slightly inflated at base, constricted at summit, with long lance-subulate teeth; petals pink, reddish, or white, one and a half times as long as calyx; limb lobed to one-fifth; coronal scales ovate, to 1.5 mm long; claw auriculate at summit; filaments hairy at base; capsule sessile, tapering at the top, pyriform, 9 mm long and 5 mm broad; seeds reniform, bluntly tuberculate, 0.8 mm long. April–June. (Plate XXXV, Figure 1).

Dry slopes, fields, and roadsides. — European part: Bl., Crim.; Caucasus: Cisc., Dag., E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm., Syr D., Amu D., Pam.-Al. Gen. distr.: Centr. and Atl. Eur., W and E. Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from Spain and France. Type in London.

Economic importance. A weed of field crops in the southern part of the USSR.

152. *S. conoidea* L. Sp. pl. (1753) 418; Ldb. Fl. Ross. I, 314; Boiss. Fl. Or. I, 580; Rohrb. Monogr. Silene 92; Williams in Journ. of Linn. Soc. XXXII (1896) 52. — *Cucubalus conoideus* Lam. Fl. Franc. III (1778) 27. — *Silene cylindriflora* Otth in DC. Prodr. I (1824) 371. — *S. dioica* Fisch. et Mey. Ind. Sem. Horti Petrop. 7 (1830) 60. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 272, f. 5062 (sub. *S. conica*).

Annual; stem 25–60 cm long, branched at summit or at base, covered, as are the leaves, with short glandular hairs; leaves lanceolate, acute, 5 cm long and 0.5–1 cm broad, sessile; flowers several or solitary; pedicels about as long as calyx; bracts herbaceous, abruptly long-acuminate from ovate base; calyx tubular-conic, 20–32 mm long; fruiting calyx strongly inflated and to 10–15 mm broad in lower part, 30-nerved, glandular-hairy, with long lance-subulate teeth; petals pink or reddish, 25–35 mm long; limb irregularly notched; coronal scales fringed-incised at apex, to 2 mm long; claw glabrous, enlarged at summit; filaments usually hairy in lower half, more rarely glabrous; capsule pyriform, 15–18 mm long and in lower part to 10 mm broad; carpophore short; seeds reniform, ca. 1.5 mm long, bluntly tuberculate. April–May. (Plate XXXV, Figure 2).

Note. Formation of cleistogamous flowers was observed in *Silene conoidea* L. — prol. cleistogama N. Troitzk. (in Vestn. Tifl. Bot. Sada 38 (1916) 122., Plate 4).

Argillaceous, stony, and turfy slopes, wastes, surroundings of fields, and among crops. — Caucasus: Bl., Dag., E. and S. Transc., Tal.; Centr. Asia: Kyz. K., Kara K., Syr D., Amu D., Mtn. Turkm., Pam.-Al. Gen. distr.: Med., Bal.-As. Min., Iran., Ind.-Him., Dzu.-Kash. Described from Spain. Type in London.

153. *S. coniflora* N. Esenb. ex Otth in DC. Prodr. I (1824) 331; Boiss. Fl. Or. I, 578; Rohrb. Monogr. Silene, 90; Williams in Journ. of Linn. Soc. XXXII (1896). — *S. acarpophora* Griseb. Spicil. I (1843) 172.

Annual; stem 5–15 cm long, commonly branched, soft-pubescent, glandular at summit; leaves lance-linear, 2–3 cm long and 3–5 mm broad, gradually attenuate, both surfaces pubescent; bracts linear, acute; flowers several at summit of stem; calyx cylindric, 12–15 mm long, inflated in fruit, attenuate at summit, 20-nerved, hispidulous, the long-acuminate teeth one-third length of calyx; petals white or roseate; limb cuneate-oval, entire; coronal scales oblong; capsule ovoid-oblong, 8–11 mm long; carpophore 1 mm long; seeds finely rugulose. April–May.

Dry argillaceous or stony slopes. — Centr. Asia: Kara K., Kyz. K., Mtn. Turkm., Amu D., Syr D., Pam.-Al. **Gen. distr.:** As. Min., Iran. Described from Mesopotamia. Type in Geneva.

692

Genus 488. **LYCHNIS** * L.**

L. Sp. pl. (1753) 436. — Flox Adans. Fam. (1763) 622. — Flos cuculi Opiz., Seznam (1842) 44.

Flowers perfect, in loose inflorescences or heads; calyx tubular or campanulate, not inflated, more or less clavately enlarged in fruit, 10-nerved, 5-toothed; petals 5, white, pink, pale yellow, or bright red; limb entire or mostly 2- (or more)-fid; coronal scales inserted on a small convex hollow protuberance; stamens 10; styles 5; capsule 1-loculed, dehiscing by 5 teeth; seeds small, tuberculate. Perennial herbs; leaves opposite, linear-lanceolate, ovate-lanceolate, or oblong-spatulate, exstipulate.

1. Petals 9–13 mm long, white, roseate, or pale yellow; leaves linear-lanceolate, lanceolate, or oblong 2.
- + Petals 2–4 cm long, bright red or raspberry-colored; leaves ovate-lanceolate, lanceolate, or oblong-ovate 5.
2. Leaves lanceolate or oblong (rarely linear-lanceolate); calyx 9–12 mm long, cylindric to subcampanulate, 10-nerved 1. **L. ajanensis** Rgl.
- + Leaves linear-lanceolate; calyx 6–8 mm long, campanulate, the nerves mostly obsolescent 3.
3. Flowers mostly numerous, in a corymbose inflorescence; petals white or roseate; coronal scales small, oblong-oval; stems 8–30 cm long 2. **L. sibirica** L.
- + Flowers numerous, in a loose corymbose inflorescence; petals pale yellow or white; coronal scales small, lanceolate or triangular-ovate; stems 4–15 cm long 4.
4. Plants woolly-pubescent; petals white; coronal scales triangular-ovate, obtuse 3. **L. villosula** (Trautv.) Gorschk.
- + Plants hispidulous; petals lurid or white; coronal scales lanceolate, acute 4. **L. samojedorum** (Sambuk) Gorschk.
5. Petal limb strongly dissected, almost fringed; leaves elongate-lanceolate, 4–13 cm long and 3.5 mm broad 5. **L. wilfordii** (Rgl.) Maxim.
- + Petal limb 2-fid or notched; leaves oblongly oval-lanceolate or ovate, 10–12 cm long and 4 cm broad 6.
6. Petal limb deeply notched; petals white or raspberry-rose; leaves oblong-lanceolate 6. **L. cognata** Maxim.

693

* Name occurring in the writing of Theophrastus, derived from Greek *lychnos*, lamp, as the leaves of *Lychnis coronaria* (L.) Desv. were used for wicks.

** Treatment by S. G. Gorshkova.

- + Petal limb deeply 2-fid, the lobes oblong-linear or broad-ovate; petals bright red or flame-colored; leaves ovate-lanceolate or oblong-ovate . . . 7.
- 7. Calyx campanulate, densely tomentose; petals flame-red, about twice as long as calyx; petal lobes limb oblong-linear . . . 7. *L. fulgens* Fisch.
- + Calyx tubular or oblong-clavate, sparsely hairy; petals bright red, one and a half times as long as calyx; petal lobes broad-ovate . . . 8. *L. chalconica* L.

1. *L. ajanensis* Rgl. in Bull. Soc. Nat. Mosc. XXXIV, II (1861) 564. — Melandrium triflorum β ajanense Rgl. et Tiling, Fl. Ajan. (1859) 69. — Melandrium ajanense Rohrb. in Linnaea XXVI (1869–70) 230.

Perennial, herbaceous, villous-canescens with a dense coat of rather long straight hairs; stems numerous, erect or ascending, 6–14 cm long, terete, with a basal leaf rosette; leaves lanceolate or occasionally oblong, rarely linear-lanceolate, acute, the cauline leaves sessile, 8–25 mm long, 2–6 mm broad, the radical petiolate, 2–6 cm long and 1–6 mm broad; flowers in a forked corymbose inflorescence; pedicels erect, shorter than calyx; calyx oblong-cylindric to subcampanulate, green or in upper part reddish-violet, heavily pubescent, 9–12 mm long and 5 mm broad, 10-nerved; teeth subovate or triangular, obtuse, scarious-margined; petals white or roseate, about twice as long as calyx; limb notched, the rounded lobes 1–2 mm long; coronal scales small, oblong, dentate; capsule oblong-ovaloid, slightly exceeding calyx; seeds numerous, 0.5 mm long, reniform, brown, minutely and bluntly tuberculate. July. (Plate XLII, Figure 4).

Dry hills. — Far East: Okh. Endemic. Described from the Far East (Port Ayan). Type in Leningrad.

2. *L. sibirica* L. Sp. pl. (1753) 437; Turcz. Fl. baic.-dah. I, 212; Ldb. Fl. Ross. I, 331; Kom., Fl. Manchzh. II, 201; Kryl., Fl. Zap. Sib. V, 1072. — Melandrium sibiricum A. Br. in Flora XXVI (1843) 371. — Exs.: HFR no. 1208.

694 Perennial, hispidulous; stems rather numerous, erect or slightly deflexed, 8–30 cm long, with a basal leaf rosette; leaves linear-lanceolate, acute, 1–4 cm long and 1–4 mm broad, the cauline sessile, the radical petiolate; flowers erect, in a loose forked corymb; calyx campanulate, 6–8 mm long 3–4 mm broad, obsoletely nerved; teeth triangular, obtusish, scarious-margined; petals roseate or white, one and a half times to twice as long as calyx (*L. sibirica* subsp. *jakutensis* Sambuk); limb lobed to one-quarter or one-third into oblong lobes; coronal scales small, oblong-ovate; capsule oblong-ovaloid; seeds small, rounded-cordate, brown, slightly and minutely tuberculate. May–June–July. (Plate XLII, Figure 1).

Southern hill slopes, gravelly hillocks, and pine woods on sandy soil. — European part: V.-Kama; W. Siberia: Ob, U. Tob., Alt.; E. Siberia: Yen., Lena-Kol., Ang.-Say, Dau.; Far East: Ze.-Bu., Uss., Kamch. Gen. distr.: Mongolia. Described from Siberia. Type in London.

3. *L. villosula* (Trautv.) Gorschk. comb. nova. — *L. ajanensis* var. *villosula* Trautv., Syllabus plant. Sibiriae bor.-or. (1888) 18. — *L. sibirica* ssp. *villosula* A. Tolm., Tr. Polyarnoi Kom., no. 8 (1932) 118. — Ic.: A. Tolm., l. c., fig. 27.

Perennial, densely woolly with long hairs; stems mostly numerous, erect or sometimes slightly deflexed, 4–15 cm long, with a basal rosette; leaves linear-lanceolate, 1.5–2 cm long and 2–3 mm broad, acute, sessile; flowers few in a very loose forked corymb; pedicels of upper flowers often shorter than calyx; calyx campanulate, obsoletely nerved, 6–8 mm long and 4–5 mm broad; teeth elongate-triangular, subacute, ciliate-margined; petals white, 12–13 mm long, 6–7 mm broad, about twice as long as calyx; limb notched to about 1.5 mm, with rounded lobes; coronal scales small, triangular-ovate, obtuse (1 cm long [?], 1 mm broad); ovary oblong. July. (Plate XLII, Figure 2).

Dry sandy places, islands, dry riverside slopes. — Arctic: Arc. Sib. (74°27' N. lat. — 102°50' E. long.). Endemic. Described from the Lena estuary (Tonald-Kol). Type in Leningrad.

4. *L. samojedorum* (Sambuk) Gorschk. comb. nova. — *L. sibirica samojedorum* Sambuk in Izv. Akad. Nauk SSSR VII, Ser. XXII (1928) 47. — Ic.: Sambuk, l. c., tab. III, f. A.

695 Perennial, densely covered with short hairs; stems numerous, simple, 4–12 cm long, obscurely dichotomously branched in upper part, with a basal rosette; leaves linear-lanceolate, 5–25 mm long, 2–3 mm broad, acute, sessile; flowers few in a loose corymb; pedicels of upper flowers shorter than calyx; calyx campanulate, 7–8 mm long and 4–5 mm broad; teeth elongate-triangular, subobtus, scarious-margined; petals pale yellow or white, 8–11 mm long and 3.5–4 mm broad, about twice as long as calyx; limb notched to 1 1/2–2 mm into rounded lobes; coronal scales lanceolate, acute, 0.75 mm long and 0.25 mm broad; ovary ovoid. July. (Plate XLII, Figure 3).

Elevated terraces and sandy slopes. — Arctic: Arc. Sib. Endemic. Described from the Pechora River (Maritime Station). Type in Leningrad.

5. *L. wilfordii* (Rgl.) Maxim. in Bull. Acad. Pétersb. XVII (1872) 178. — *L. laciniata* var. *mandshurica* Maxim. in Bull. Acad. Pétersb. XI (1867) 429, non *L. laciniata* Lam. (1779); Kom., Fl. Manchzh. II, 203. — *L. fulgens* var. *Wilfordii* Rgl. in Bull. Soc. Nat. Mosc. XXXIV (1861) 575.

Perennial, glabrous except pedicels; stem erect, simple or slightly branched, 85 cm–1 m long; leaves elongate-lanceolate, acute, narrowing toward base, subamplexicaul, 4–13 cm long and 1.5–3.5 cm broad; flowers large, in a flat many-flowered cyme; pedicels shorter than to sometimes equaling calyx, slightly pubescent; calyx cylindric, 12–17 mm long and 4–5 mm broad; teeth short, triangular, acute, narrowly scarious-margined; petals narrowly cuneate, bright red; limb deeply dissected into subulate to broadly filiform almost fringed segments; capsule oblong-ovaloid, equaling or exceeding calyx; seeds small, round, brown, densely covered with prickles and tubercles. June–July–August.

Meadows. — Far East: Uss. Gen. distr.: Jap.-Chi. Described from Vladivostok. Type in Leningrad.

6. *L. cognata* Maxim. Prim. Fl. Amur. (1859) 55; Kom., Fl. Manchzh. II, 209. — *L. fulgens* var. *cognata* Rgl. in Bull. Soc. Mosc. (1861) 575. — Ic.: Ed. Makino (Iconogr.) Pl. Nippon. VIII (1910) tab. 56.

Perennial; sparsely covered with stiffish hairs; stem erect, simple, to 125 cm long; leaves oblong-lanceolate, acuminate, narrowing toward base, 5–9.5 cm long and 1–3 cm broad; flowers large, in a dense corymbose-capitate inflorescence or cyme; pedicels one-fifth to one-fourth as long as calyx; calyx campanulate or elongate-clavate, 2–2.5 cm long and 6–7 mm broad, 10-nerved, slightly pubescent or often glabrate; teeth triangular, acute; petals raspberry-rose; limb deeply notched; coronal scales lanceolate, retuse; capsule oblong-ovaloid. June–July. (Plate XLII, Figure 6).

Wood margins and coppices, on wet soil. — Far East: Uss. **Gen. distr.:** Jap.-Chi. Described from N. China (Poshuanchang). Type in Leningrad.

96

7. **L. fulgens** Fisch. in Curt. Bot. Mag. XLVI (1819) tab. 2104; Ldb. Fl. Ross. I, 330; Turcz. Fl. baic.-dah. I, 211; Kom., Fl. Manchzh. II, 202. — *Agrostemma fulgens* Doll. Rhein. Fl. (1843) 643. — *L. fulgens* var. *typica* Rgl. Bull. Soc. Mosc. XXXIV (1861) 575. — Ic.: Curt., l. c., tab. 2104; Neubert s. Deutsch. Gart. Mag. I (1898) tab. 8; Kom. and Alis., Oprod. rast. Dal'nevost. kr. I, tab. 150. — Exs.: HFR no. 1914.

Perennial, pubescent; stem simple, erect, rather bluntly 4-angled, 28–85 cm tall; leaves oblong-ovate or oval-lanceolate, 3.5–10 cm long and 3.5 cm broad, acuminate, the broad base rounded; flowers large, in a 3–more-flowered corymbose-capitate inflorescence subtended by 2 lanceolate acute leaves; pedicels one-fifth as long as calyx; calyx campanulate, densely tomentose, 1.5–2 cm long and 4–6 mm broad, obscurely nerved; teeth triangular, acute; petals flame-red, about twice as long as calyx; limb deeply cleft into oblong-linear lobes; seeds small, dark brown to black, rounded, sharply tuberculate. June–August. (Plate XLII, Figure 5).

Meadows and shrub thickets. — E. Siberia: Dau.; Far East: Ze.-Bu., Uss. **Gen. distr.:** Jap.-Chi. Described from cultivated specimens grown from seed obtained from the Gorenki Botanical Garden. Type in London.

8. **L. chalconica** L. Sp. pl. (1753) 436; Ldb. Fl. Ross. I, 330; Shmal'g., Fl. I, 144–145; Shishkin in Fl. Yugo-Vost. IV, 279; Kryl., Fl. Zap. Sib. V, 1071. — Ic.: Bot. Mag. tab. 257; Rchb. Ic. Fl. Germ. VI, tab. 505; Hegi, Ill. Fl. Mitt. Eur. III, 297, f. 575; Fl. Yugo-Vost. IV, Fig. 313.

99

Perennial; stem erect, scarcely branched, 40–125 cm long, glandular-hairy; leaves ovate-lanceolate to ovate, acute, cordate at base, 2–8 cm long and 2–4 cm broad, hispid beneath, on the margin and on the veins; flowers large, in a dense corymbose-capitate or capitate many-flowered inflorescence subtended by a pair of leaves; pedicels short, sparsely hispid like the calyx; calyx tubular or oblong-clavate, 15–18 mm long and 3–4 mm broad; teeth triangular, acute; petals bright red; limb 2-cleft to the middle or beyond into broad-ovate lobes; coronal scales long, linear or subulate; capsule ovoid; seeds triangular-cordate, brown, tuberculate. June–August. (Plate XLV, Figure 4).

Damp forest glades, wood margins, coppices, and gullies. — European part: U. Dnp., M. Dnp., V.-Don, Transv., Bl., L. Don; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Ar.-Casp., Balkh., T. Sh. **Gen. distr.:** Mong. Described from Europe (Tataria). Type in London.



PLATE XLII. 1. *Lychnis sibirica* L.— 2. *L. villosula* (Trautv.) Gorschk.— 3. *L. samojedorum* (Sambuk) Gorschk.— 4. *L. ajanensis* Rgl.— 5. *L. fulgens* Fisch.— 6. *L. cognata* Maxim.
 Annotations to all illustrations: a) flower, b) calyx, c) calyx stretched open, d) pistil, e) petal.

Genus 489. **CORONARIA** * L.**

L. Gen. pl. ed. 1 (1737) 135.

Flowers solitary or in a paniculate inflorescence; calyx campanulate, 10-nerved, 5-toothed; petals pinkish-red or white; limb entire or deeply cleft; coronal scales inserted on the flat base of the limb; stamens 10; styles 5; capsule unilocular, subsessile, dehiscent by teeth. Perennial herbs, sparsely or densely pubescent, with a radical leaf rosette; upper leaves linear-lanceolate to lanceolate, acute, sessile; basal leaves oblong-ovate or oblong-spatulate, petiolate.

1. Flowers solitary; petals red; limb obovate, entire; capsule oblong; plants densely white-tomentose throughout 1. **C. coriacea** (Moench) Schischk.
- + Flowers in a loose paniculate or corymbose-paniculate inflorescence; petals pink, rarely white; limb deeply 4-fid; capsule broad-ovoid; stems and pedicels hairy 2. **C. flos cuculi** (L.) A. Braun.

1. **C. coriacea** (Moench) Schischk. in sched. — *Lychnis coriacea* Moench, Meth. (1794) 709. — *Agrostemma coronaria* L. Sp. pl. (1753) 436. — *Lychnis coronaria* Desr. in Lam. Encycl. III (1789) 643; Ldb. Fl. Ross. I, 331; Boiss. Fl. Or. I, 658; Shmal'g., Fl. I, 144; Grossg., Fl. Kavk. II, 416. — *Silene coronaria* Clairv. Manuel (1819) 145. — *Coronaria tomentosa* A. Br. in Fl. XXVI (1843) 368. — *C. coronaria* Huth in Helios Frankf. 11 Jahrb. (1893) 134. — Ic.: Rchb. Ic. Fl. Germ. VI (1844) 308, f. 5133; Hegi, Ill. Fl. Mitt. Eur. III (1909) 297, tab. 100, f. 1.

Perennial, densely silky white-tomentose; stem erect, forked at summit, to 30–60 cm long; lower leaves oblong-ovate, petiolate; upper leaves lanceolate, acute, 3.5–8 cm long and 1–2 cm broad, sessile; flowers large, solitary, long-pedicelled; calyx tubular-campanulate, coriaceous, 15–17 mm long and 7–8 mm broad, 10-ribbed; teeth lanceolate, deflexed; petals red; limb obovate, entire; coronal scales cartilaginous; capsule oblong, subsessile; seeds very small, rounded-cordate, black, minutely tuberculate. July.

Dry mountain slopes and meadows. — European part: Crim.; Caucasus: E. Transc.; Centr. Asia: Syr D., Pam.-Al., T. Sh. **Gen. distr.:** Med., Bal.-As. Min., Ind.-Him. Described from Italy. Type in London.

2. **C. flos cuculi** (L.) A. Braun in Flora XXVI (1843) 386; Shishk. in Fl. Yugo-Vost. IV, 278. — *Lychnis flos cuculi* L. Sp. pl. (1753) 436; Ldb. Fl. Ross. I, 330; Turcz. Fl. baic.-dah. I, 241; Boiss. Fl. Or. I, 658; Shmal'g., Fl. I, 144; Kryl., Fl. Zap. Sib. V, 1073. — *L. lusitanica* Mill. Gard. Dict. ed. 8 (1768) no. 8. — *L. laciniata* Lam. Fl. Franc. III (1779) 51. — *Agrostemma flos cuculi* C. Don, Gen. Syst. (1831) 416. — *Coccyganthe pratensis* Rupr. Fl. Ingr. (1860) 165. — Ic.: Rchb. Ic. Fl. Germ. VI (1844) 306, f. 5129. — Hegi Fl. Mitt.-Eur. (1909) tab. 100, f. 2; Sorn. rast. SSSR, II (1934) 499, Fig. 155. — Exs.: Mus. Bot. Univ. Helsingf. no. 617 (*Lychnis flos cuculi* L. f. albiflora); Fl. Bohemiae et Moraviae exs. F. Petrak no. 1216 (*L. flos cuculi*); Fl. Gall. et Germ. exs. Billot no. 116 (*L. flos cuculi*).

* From Latin *corona*, wreath, crown, alluding to shape of corolla.

** Treatment by S. G. Gorshkova.

Perennial; stem erect, more or less branched only at summit, sulcate, to 30–80 cm long, covered, as are pedicels, with retrorse-appressed hairs; radical leaves oblong-spatulate, petiolate; leaves acute, the radical oblong-spatulate, petiolate, the upper narrowly linear to linear-lanceolate, 3–9 cm long and 3–10 mm broad, sessile; flowers in a loose panicle with opposite branches or a corymbose-paniculate inflorescence; pedicels long, sometimes shorter than calyx; calyx campanulate, submembranous, 6–8 mm long and 3–5 mm broad, faintly violet-tinged, with 10 prominent dark green nerves; teeth triangular, acute, ciliate-margined; petals pink, rarely white, about twice as long as calyx; limb deeply 4-parted into narrow divergent linear segments; coronal scales elongate, acute; capsule broad-ovoid, sessile; seeds very small, reniform, blackish-brown, minutely muricate. May–June–July.

Wet water-meadows and glades; margins of bogs. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U.Dnp., V.-Don, L.Don, Ural; Caucasus: Cisc.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Dau. **Gen. distr.:** Scand., Centr. Eur., Med. Described from Europe. Type in London.

Economic importance. Occurring as a weed on wet fields of clover and other forage plants.

701 Genus 490. **MELANDRIUM*** ROEHL.

Roehl. Deutschl. Fl. ed. 2, II (1812) 274. — Melandryum Rchb. Handb. (1837) 298. — Melandrum Blytt, Norges Fl. III (1876) 1068. — Physocarpus Neck. Elem. II (1790) 164.

Flowers perfect or unisexual and then plants monoecious or dioecious; calyx 5-toothed, 10- or 20-nerved, campanulate or ovoid, often inflated; petals with 2-lobed limb; coronal scales present, more rarely wanting; stamens 10; styles 5 or 3; capsule unilocular, many-seeded, dehiscing by 10 or 6 teeth. Annual or perennial herbs, with rather profuse simple or glandular indument.

1. Styles 3; capsule dehiscing by 6 teeth (subgenus *Elisanthe* (Fenzl) Schischk.) 2.
- + Styles 5; capsule dehiscing by 10 teeth 16.
2. Calyx 20–40 mm long, the teeth long-acuminate 3.
- + Calyx 7–20 mm long, the teeth acute or obtuse 4.
3. Calyx 20–25 mm long; capsule subsessile; annuals 9. *M. noctiflorum* (L.) Fries.
- + Calyx 20–40 mm long; capsule borne on a pubescent carphophore 5–6 mm long; perennials 1. *M. ovalifolium* Rgl. et Schmalh.
4. Petal limb fringed-multifid 3. *M. adenophorum* Schischk.
- + Petal limb 2-lobed 5.
5. Petals dark rose or purple, deeply 2-lobed, each lobe with a lateral tooth; capsule 4–8 mm long 13. *M. olgae* Maxim.
- + Petals whitish or greenish-white, rarely pink; capsule large . . . 6.
6. Calyx glabrous 15. *M. firmum* (Sieb. et Zucc.) Rohrb.
- + Calyx more or less hairy 7.
7. Stems numerous, 7–30 cm long, simple, densely matted; flowers solitary or several 8.

* A plant name occurring in the writings of Pliny, derived from Greek *melas*, black, and *dris*, oak; connotation of the name not sufficiently clear.

- + Stems solitary or several, branched; flowers usually numerous 9.
8. Calyx 10 mm long; plants covered with simple hairs (Sakhalin) 8. *M. sachalinense* (F. Schmidt) Schischk.
- + Calyx 17–18 mm long; plants glandular-shaggy (Gr. Caucasus) 7. *M. akinfievii* (Schmalh.) Schischk.
- 02 9. Stems divaricately branched from base, covered with long hairs; leaves ovate or ovate-lanceolate, 2–4 cm broad 10.
- + Stems simple or slightly branched only at summit, covered with short simple or glandular hairs; leaves lanceolate, 4–15(20) mm broad 11.
10. Calyx 12–14 mm long, the triangular-subulate teeth one-third length of calyx; capsule subsessile 4. *M. ferganicum* (Preobr.) Schischk.
- + Calyx 17–20 mm long, the broadly lanceolate obtuse teeth one-sixth to one-fifth length of calyx; capsule borne on a carpophore 5–7 mm long 2. *M. fedtschenkoanum* (Preobr.) Schischk.
11. Calyx 9–12 mm long, with acute teeth; flowers in a loose panicle or a 1-sided raceme; petals pink, rarely white 12.
- + Calyx 14–19 mm long, with obtuse teeth; flowers in opposite axillary clusters forming a terminal raceme; petals white 14.
12. Petals very slightly exceeding calyx; annual. Siberia and Far East 14. *M. apricum* (Turcz.) Rohrb.
- + Petals pink, one and a half times as long as calyx. Central Asia 13.
13. Calyx 10–12 mm long; teeth 2–2.5 mm long; petals entire or notched 6. *M. ruinarum* M. Pop.
- + Calyx 14–15 mm long; teeth linear-subulate, 5 mm long; petal limb cleft to the middle 5. *M. erubescens* Schischk.
14. Petals 2-fid; biennial 10. *M. viscosum* (L.) Čel.
- + Petals 4-fid or multifid 15.
15. Petals multifid 12. *M. suaveolens* (Kar. et Kir.) Schischk.
- + Petals 4-fid 11. *M. quadrilobum* (Turcz.) Schischk.
16. Flowers perfect; petals lightly exceeding to one and a half times as long as calyx; perennials (Subgenus *Gastrolychnis* (Fenzl) Schischk.) 17.
- + Plants dioecious; petals one and a half times to twice as long as calyx; biennials, rarely perennials (Subgenus *Eumelandrium* (A. Br.) Schischk.) 30.
17. Radical leaves well developed; cauline leaves similar or less developed; fruiting calyx inflated, its basal part saccate 18.
- + Cauline leaves large, well developed; radical leaves wanting in grown plants; calyx expanded 28. *M. saxatile* (Turcz.) A. Br.
- 703 18. Flowers nodding at anthesis 19.
- + Flowers erect at anthesis 22.
19. Corolla large, much exerted 20.
- + Corolla scarcely exerted or equaling calyx 21.
20. Flowers 2–7, approximate at summit of stem; pedicels short 18. *M. sordidum* (Kar. et Kir.) Rohrb.

- + Flowers solitary, or else 2 or 3 and then remote; pedicels longer 19. *M. triste* (Bge.) Fenzl.
21. Cauline leaves rather poorly developed, always less than the radical; seeds winged, more or less smooth 20. *M. apetalum* (L.) Fenzl.
- + Cauline leaves well developed, the lowest pairs often larger than the radical; seeds wingless, tuberculate 27. *M. baicalense* (Suk.) Tolm.
22. Corolla very slightly exserted or not at all; seeds wingless, tuberculate 23.
- + Corolla markedly exserted 24.
23. Leaves elongate-lanceolate, subacuminate 26. *M. brachypetalum* (Horn.) Fenzl.
- + Leaves linear, subobtusate 25. *M. taimyrense* Tolm.
24. Flowers white or pale rose 25.
- + Flowers dark, lilac or purple 28.
25. Radical leaves broad, elongate-oval, the cauline dissimilar; tall plant with a relatively very slender stem 24. *M. gracile* Tolm.
- + Radical leaves narrow; cauline very similar; lower plants (*M. affines* 1. [?]) 26.
26. Cauline leaves 1 (more rarely 2) pairs, always shorter than the radical 21. *M. affine* J. Vahl, s. str.
- + Cauline leaves 2 or 3 pairs, the lower as long as or slightly longer than the radical 27.
27. Plant 8–25 cm high; flowers commonly solitary, rarely 2 or 3 29. *M. angustiflorum* (Rupr.) Walp.
- + Plants 20–40 cm high; flowers 2 or 3 together 23. *M. tenellum* Tolm.
28. Calyx broadly campanulate; corolla broad, completely filling up the calyx or nearly so 29.
- + Calyx elongate-campanulate; corolla subtubular in lower part, much narrower than calyx 16. *M. longicarpophorum* Kom.
- 704 29. Plants less than 20 cm high; flowers nearly always solitary; corolla lilac-rose 17. *M. soczavianum* Schischk.
- + Flowers not less than 30 cm high; flowers 2–7; corolla dingy violet 18. *M. sordidum* (Kar. et Kir.) Rohrb.
30. Petals red or light purple, expanding at day time; calyx 8–10 mm long, covered with simple hairs; capsule ovoid-globose 29. *M. silvestre* (Schkurh) Roehl.
- + Petals white; calyx 10–15(20) mm long; stems commonly glandular-pubescent; capsule pyriform 31.
31. Fruiting calyx tightly enclosing the capsule (W. Transc.) 30. *M. balansae* Boiss.
- + Fruiting calyx inflated, loosely enveloping the capsule 32.
32. Calyx strongly accrescent in fruit, finally 25–40 mm long and 20–30 mm broad 32. *M. boissieri* Schischk.
- + Calyx but slightly accrescent in fruit 33.
33. Stems 12–40 cm long; leaves lanceolate, 5–7 mm broad; calyx covered with simple hairs only 33. *M. astrachanicum* Pacz.
- + Stems 40–100 cm long; leaves elliptic; calyx covered with simple as well as glandular hairs 31. *M. album* (Mill.) Garcke.

Subgenus 1. **ELISANTHE** (Fenzl) Schischk. subgen. nov. — *Saponaria* sect. *Elisanthe* Fenzl in Endl. Gen. (1840) 972. — *Melandrium* sect. *Elisanthe* A. Br. in Flora XXVI (1843) 371. — Gen. *Elisanthe* Rchb. Nomencl. (1841) 206. — Gen. *Silenanthe* Griseb. et Schrenk in Wieg. Arch. XVIII (1852) 300. — Flowers perfect; styles 3, capsule unilocular, dehiscent by 6 teeth. Annuals, biennials, or perennials, with lanceolate, spatulate, or ovate leaves.

Series 1. *Elata* Schischk. — Perennials; stem (20) 30–80 cm long; leaves rather large, ovate or ovate-lanceolate.

1. *M. ovalifolium* Rgl. et Schmalh. in Izv. O-va Lyubit. Estestv., Antrop. i Etnogr. XXXIV (1882) 15; Raikova in Opr. rast. okr. Tashkenta II, 114. — *Silene odontopetala* var. *ovalifolia* M. Pop. in Bull. Univ. As. Centr. XII Suppl. (1926) 7. — Ic.: Opr. rast. okr. Tashkenta, Fig. 157. — Exs.: H. F. A. M. no. 471.

Perennial; stems 20–60 cm long, ascending at base, then erect, branched, glandular-pubescent as are the leaves; leaves ovate to broad-ovate, 2–5 cm long and 1.5–4 cm broad, rounded or somewhat cordate at base, acuminate; flowers at tips of stems and branches in few-flowered dichasia; pedicels glandular-pubescent, 1–5 cm long; bracts herbaceous, long-acuminate; calyx cylindric-clavate, (1.8)2.0–4 cm long, glandular-pubescent, with long subulate teeth; petals white or violet, twice as long as calyx; limb cleft to the middle into ovate lobes, with coronal scales; capsule ovoid, 15–18 mm long; carpophore pubescent, 5–6 mm long. June–July. (Plate XLIII, Figure 2).

Rocks and stony slopes in mountain woods, at altitudes between 1,300 and 3,400 m. — Centr. Asia: W. T. Sh., Pam.-Al. Endemic. Described from the Zeravshan valley (Varzaminor). Type in Leningrad.

2. *M. fedtschenkoanum* (Preobr.) Schischk. in Trav. Mus. botan. de l'Acad. Sc. URSS XXIV (1932) 34. — *Silene fedtschenkoana* Preobr. in Not. syst. Herb. Horti Petrop. II, 8 (1921) 30. — *Elisanthe fedtschenkoana* Schischk. in sched.

Perennial; stem 60–80 cm long, branched, covered with rather long crisp hairs; leaves ovate, 5–10 cm long and 3–4 cm broad, rounded at base and abruptly narrowed to a short petiole or sessile, acuminate at apex, slightly pubescent or glabrous, the margin beset with long soft cilia; flowers at tips of stem and branches in few-flowered dichasia; pedicels 1–5 cm long; calyx ovaloid-cylindric, 16–20 mm long and ca. 4 mm broad, somewhat inflated, covered with simple as well as glandular hairs; teeth broadly lanceolate, obtuse, one-sixth to one-fifth length of calyx, with white-scarious margin; petals whitish, one and a half times to twice as long as calyx; limb cleft to the middle into ovate lobes; coronal scales ca. 1 mm long; claw auriculate at summit, glabrous; capsule ovoid, 8–10 mm long; carpophore pubescent, 5–7 mm long; seeds reniform, ca. 1.5 mm long, bluntly tuberculate. June–August. (Plate XLIII, Figure 4).

Broad-leaved mountain woods. — Centr. Asia: W. T. Sh. (Namangan and Andizhan River). Endemic. Described from the Aflatuna River valley. Type in Leningrad.

3. *M. adenophorum* Schischk. sp. nova in Addenda V, p. 678.

Perennial; taproot stout; stem erect (?), 45 cm long, minutely and softly glandular-pubescent; radical leaves ovate to ovate-lanceolate, 2–3 cm long and 0.6–1 cm broad, acute, tapering to a rather short petiole; median and upper cauline leaves broad-ovate or some suborbicular, obtusely short-acuminate, 2–2.5 cm long and 1.5–2.2 cm broad; all leaves puberulent; flowers in cymes at tips of stem and short branches; pedicels glandular-pubescent, 2–5 mm long; calyx cylindric-clavate, 11–12 mm long, glandular-pubescent, with obtuse teeth; petals white (?), twice as long as calyx; limb fringed-multifid; coronal scales none; capsule ovoid, ca. 7 mm long; carpophore glabrous, 1.5–2 mm long. June.

706 Centr. Asia: T. Sh. Endemic. Described from the natural boundary Oital, in the former Osh Pass. Type in Leningrad.

Note. This plant has been obtained to date from only one location and it needs further study. The habitat conditions are unknown.

4. *M. ferganicum* (Preobr.) Schischk. comb. nov. — *Silene ferganica* Preobr. in Not. syst. Herb. Hort. Petrop. 8 (1923) 29. — *Elisanthe ferganica* Schischk. in sched.

Perennial; stem 40–85 cm long, branched, covered with rather long hairs; leaves ovate-lanceolate, 4–8 cm long and 2–3 cm broad, sessile, subcordate and clasping at base, long-acuminate, glabrous, the margins and midrib ciliate; upper leaves sparsely hairy; flowers at tips of stem and branches in 3–7-flowered dichasia; pedicels glandular-pubescent, 0.5–2 cm long; calyx cylindric, 12–14 mm long; teeth triangular-subulate, obtusish, scarious-margined, one-third length of calyx; fruiting calyx tightly enclosing capsule; petals pink (?), one and a half times as long as calyx; limb lobed to one-fourth or one-third, the lobes oblong; coronal scales lanceolate, ca. 1.5 mm long; capsule ovoid, 10–12 mm long, subsessile; seeds reniform, 1.2 mm long, striate. June–July. (Plate XLII, Figure 5).

Scrub at altitudes between 1,200 and 2,000 m. — Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from Nichke-Saya and the Kugart River. Type in Leningrad.

5. *M. erubescens* Schischk. sp. nova in Addenda V, p. 678.

709 Perennial; stems several, 20–70 cm long, erect, rather sparsely crisp-hairy, at the somewhat branched summit covered with short glandular hairs; leaves narrow-ovate, acute, 4–7 cm long and 1–2.5 cm broad, sessile, 7-veined, setose on the margin and on veins, narrowing toward base, often with nonelongated sterile axillary branchlets; bracts herbaceous, resembling foliar leaves but smaller; pedicels 5–20 mm long or flowers subsessile; calyx tubular, 14–15 mm long, densely glandular-pubescent, the teeth linear-subulate, acutish; fruiting calyx tightly enclosing capsule; petals pinkish-red, one and a half times as long as calyx; limb cleft to the middle into oblong lobes; coronal scales oblong, 1 mm long; claw enlarged at summit, glabrous; capsule (immature) ovoid, 12 mm long and 6 mm broad, subsessile. April–June. (Plate XLIII, Figure 3).

Thin scrub on gravelly slopes, at altitudes between 2,000 and 2,400 m. — Centr. Asia: Pam.-Al. (Gissar Range). Endemic. Described from Gazi-Mailik Range. Type in Leningrad.

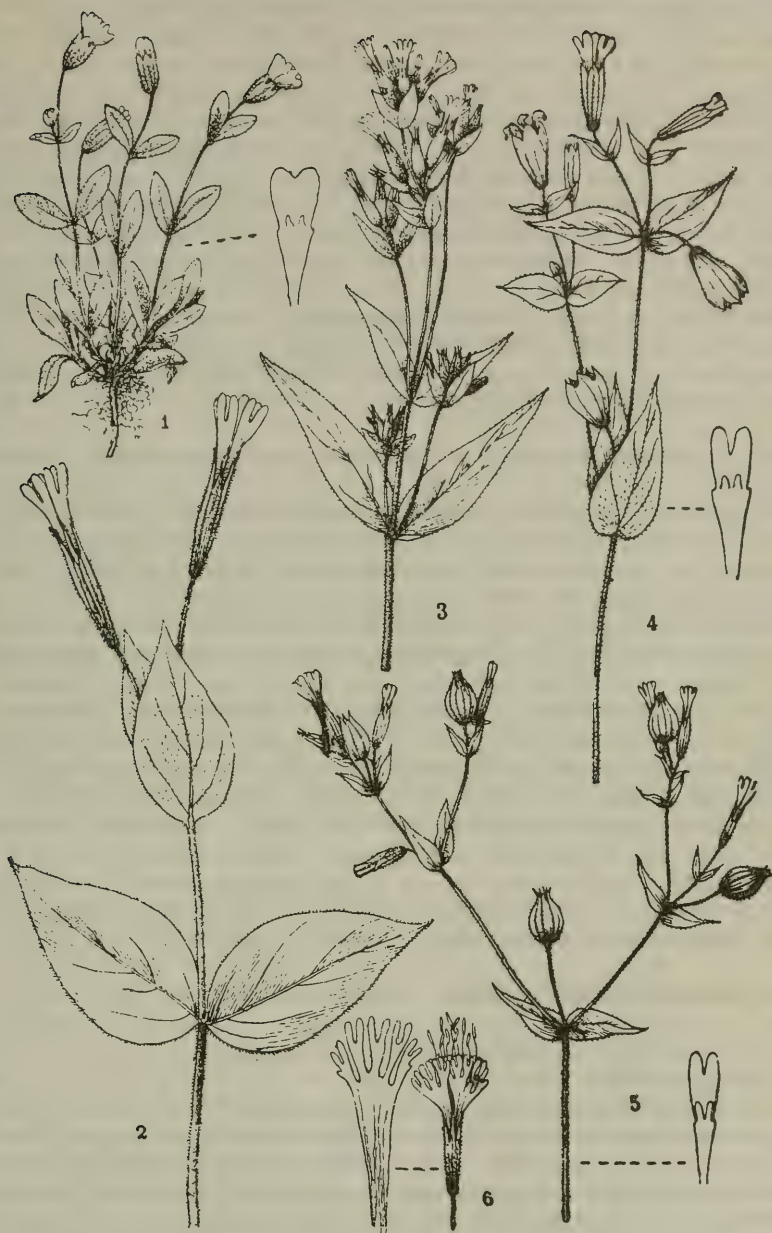


PLATE XLIII. 1. *Melandrium sachalinense* (F. Schmidt) Schischk. - 2. *M. ovalifolium* Rgl. et Schmalh. - 3. *M. erubescens* Schischk. - 4. *M. fedtschenkoanum* (Preobr.) Schischk. - 5. *M. ferganicum* (Preobr.) Schischk. - 6. *M. suaveolens* (Kar. et Kir.) Schischk.

6. *M. ruinarum* M. Pop. in Bull. Univ. As. Cent. XII Suppl. (1926) 9 in syn. — *Silene ruinarum* M. Pop., l. c. — Exs.: H. F. A. M. no. 184.

Perennial; stems several from a stout taproot, ascending, 30–50 cm long, simple or slightly branched, covered with rather long crisp hairs interspersed at summit with glandular; lower leaves narrowly obovate, 2.5–4.5 cm long and 7–10 mm broad, acute, narrowing toward base; inflorescence with partly secund short few-flowered glandular-pubescent branches; bracts herbaceous, resembling leaves but smaller; pedicels erect, shorter than calyx; calyx cylindric, 10–12 mm long, densely covered with glandular as well as some long simple hairs; teeth lanceolate, acute, 2–2.5 mm long; fruiting calyx tightly enclosing the capsule; petals pink, one and a half times as long as calyx; limb narrowly cuneate, 2-fid or notched or subentire; coronal scales lanceolate, 1 mm long; claw auriculate at summit, glabrous; capsule oblong-ovoid, 10 mm long, subsessile; seeds reniform-triangular, ca. 1 mm long, tuberculate. May.

At the foot of clayey hills among plowfields. — Centr. Asia: Pam.-Al. (Zeravshan valley, Rem villate). Endemic. Described from the site indicated. Type in Tashkent; cotype in Leningrad.

Series 2. *Humilia* Schischk. — Perennials with stems 7–20(30) cm long.

7. *M. akinfievii* (Schmalh.) Schischk. comb. nova. — *Silene akinfievii* Schmalh. in Berichte der Deutsch. Bot. Gesellsch. X (1892) 286. — *Charesia akinfievii* E. Busch in Trav. Mus. Bot. Ac. Sc. URSS XIX (1926) 182; Grossg., Fl. Kavk. II, 416. — Ic.: E. Busch., l. c., tab. XVI.

710 Perennial, softly shaggy-glandular; stems brittle, erect or somewhat flexuous, 10–30 cm long; lower leaves oblong, short-petioled; upper leaves sessile, broad-ovate, acute, 2.5–5 cm long and 2–5 mm broad; flowers solitary at tips of branches of a dichotomous inflorescence; pedicels equaling or longer than calyx; calyx cylindric-oblong, with 10 lilac-colored nerves, villous-glandular, 1.7–1.8 cm long and 7–8 mm broad; teeth triangular, acute; petals whitish-green, 2-fid; coronal scales oblong, slightly incised; capsule cylindric, short-stipitate; seeds small, brown, minutely tuberculate, papillose on the back. August. (Plate XLV, Figure 7).

Moraines and rocks near glaciers, at altitudes between 1,800 and 2,700 m. — Caucasus: Cisc. Endemic. Described from the Caucasus, Digora, Mosota-Tsvet, in the Khares valley. Type in Leningrad.

8. *M. sachalinense* (F. Schmidt) Schischk. comb. nova. — *Silene sachalinensis* F. Schmidt, Tr. Sibirsk. eksp. Russ. Geogr. Obshch. II, Bot. ch. (1874) 125; Miyabe and Miyake, Fl. of Saghalin (1915) no. 92. — Ic.: Miyabe and Miyake, l. c., pl. IV, f. 4–7.

Perennial, forming low mats; stems numerous, 7–10 cm long; puberulent, simple; radical and lower cauline leaves spatulate, 3–4.5 cm long and 5–10 mm broad, long-petioled; median leaves ovate-lanceolate, 1.5–2.5 cm long and 4–10 mm broad, sessile, short-acuminate, puberulent; flowers at tips of stems, solitary; pedicels glandular-pubescent, 8–32 mm long; calyx campanulate, 8–10 mm long and 3–6 mm broad, pubescent, the lanceolate obtusish teeth one-third length of calyx; petals white, one and a half times as long as calyx; limb slightly notched; coronal scales none; capsule ovoid, 8–10 mm long, sessile; seeds reniform, bluntly tuberculate, undulate-winged. June–July. (Plate XLIII, Figure 1).

Rocks. — Far East: Sakhalin, Endemic. Described from Khoindgu promontory near Dui, Manue and between Manue and Mungotam. Type in Leningrad.

Series 3. *Viscosa* Schischk. — Biennials or perennials; petals whitish-green or greenish-white, one and a half times as long as calyx; calyx teeth obtuse.

9. *M. viscosum* (L.) Čel. in Lotos XVIII (1868) 118; Shishk. in Fl. Yugo-Vost. IV, 282; Kryl., Fl. Zap. Sib. V, 1081. — *Cucubalus viscosus* L. Sp. pl. (1753) 414; M. B. Fl. taur.-cauc. III, 304. — *Lychnis viscosa* Scop. Fl. Carniol. ed. 2, I (1772) 306. — *Viscago viscosa* Moench, Meth. Suppl. (1802) 303. — *Cucubalus royeri* M. B. Casp. (1798) 174. — *Silene royeri* Pers. Syn. I (1805) 497. — *Silene viscosa* Pers. Syn. I (1805) 497; Ldb. Fl. Ross. I, 313; Shmal'g., Fl. I, 141. — *Elisanthe viscosa* Rupr. Fl. Cauc. (1869) 200; Grossg., Fl. Kavk. II, 416, 118. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 291, f. 5099; Hegi Ill. Fl. Mitt.-Eur. III (1909) 303, f. 577 a-e. — Exs.: Mus. Bot. Univ. Finl. Helsingf. no. 616.

711 Biennial, densely pubescent; stem erect, unbranched, 30–65 cm long, terete, densely leafy toward base; lower leaves elongate-oblong, narrowing toward base; upper leaves lanceolate, acute, sessile, somewhat connate at base, repand; inflorescence elongate, many-flowered, racemiform, composed of 1–5-flowered cymes; pedicels short; calyx tubular or cylindric-clavate, 14–19 mm long and 4–5 mm broad, glandular-pubescent; teeth obtuse, with a narrow white-scarious margin; petals yellowish-green or white; limb deeply 2-fid, toothed, one-third longer than calyx; coronal scales none; claw ciliate; capsule oblong-ovoid, dehiscent by 6 teeth, twice to thrice as long as carpophore; seeds small, reniform, light brown, tuberculate. May–July.

Dry slopes, stony places, fields, and steppes. — European part: Kar.-Lap. (Kola Peninsula, city of Kirov), U. V., V.-Kama, M. Dnp., V.-Don, Transv.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Ang.-Say.; Caucasus: Cisc., Dag., S. Transc.; Tal.: Centr. Asia: Balkh., Syr D., Ar.-Casp., Mtn. Turkm. Gen. distr.: Scand., Centr. Eur., Iran, Mong. Described from Europe. Type in London.

10. *M. quadrilobum* (Turcz.) Schischk. comb. nova. — *Silene quadriloba* Turcz. ex Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 167; Ldb. Fl. Ross. I, 777. — *Silene viscosa* var. *quadriloba* Trautv. Enum. Pl. soong. (1860) 150. — *M. viscosum* f. *quadrilobum* Kryl. in Fl. Sib. occ. V (1931) 1082.

Perennial or biennial, glandular-hairy throughout; stems several or solitary, erect, simple, 30–70 cm long; leaves oblong or lanceolate, 3–7 cm long and 5–15(20) mm broad, the radical and lower cauline short-petioled and usually wavy-margined, the upper sessile, acuminate; flowers at ends of stems in axillary clusters forming a long racemose-paniculate inflorescence; calyx cylindric-clavate, 15–18 mm long and 3–4 mm broad, densely glandular-hairy; teeth with white-scarious margin; petals white; limb 4-fid, the 2 inner lobes somewhat enlarged and crenate at apex, usually larger than the lance-acuminate outer lobes; claw enlarged at summit, glabrous. June–July.

Meadow steppes, solonetz meadows, and stony slopes. — W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say. (Minusinsk); Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh. **Gen. distr.:** Mong. Described from the Lepsa River. Type in Moscow; cotype in Leningrad.

11. *M. suaveolens* (Kar. et Kir.) Schischk. comb. nova. — *Silene suaveolens* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 168; Ldb. Fl. Ross. I, 777. — *M. viscosum f. suaveolens* Schischk. in Kryl., Fl. Sib. occid. V (1931) 1082. — *Silene viscosa f. multifida* Kryl. in Fl. Alt. I (1901) 146. — *Carpophora hoffmeisteri* Klotzsch. Bot. Ergebn. der Reise Prinz. Woldeimar von Preussen (1862) 139. — Ic.: Klotzsch., l. c., tab. 32.

712 Biennial or perennial; taproot rather stout, the collar clothed with remnants of dead leaves; stems several, erect, 30–80 cm long, densely pubescent; radical leaves numerous, soon wilting; cauline leaves linear-lanceolate, 3–8 cm long and 0.3–3 cm broad, acute, narrowing toward base; inflorescence loosely speciform-racemose; flowers short-pedicelled, fragrant; calyx clavate-cylindric, 14–20 mm long and 4–5 mm broad, densely pubescent; teeth obtuse, with white-scarious margin; petals white, one and a half times as long as calyx; limb multifid; coronal scales none; capsule oblong, 12 mm long and 4 mm broad; carpophore densely pubescent, 3 mm long; seeds reniform, ca. 0.75 mm long, tuberculate. June–August. (Plate XLIII, Figure 6).

Argillaceous slopes. — Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** Dzu.-Kash., Him. Described from Sassyk-Pastau. Type in Moscow; cotype in Leningrad.

Series 4. *Noctiflora* Schischk. — Biennial plants with rose or purple flowers; petals one and a half times as long as calyx, with acute or subulate teeth.

12. *M. noctiflorum* (L.) Fries in Lindbl. Bot. Notis. (1842) no. 10; Shishk. in Fl. Yugo-Vost. IV, 282; Kryl., Fl. Zap. Sib. V, 1080. — *Silene noctiflora* L. Sp. pl. (1753) 419; Ldb. Fl. Ross. I, 314; Shmal'g., Fl. I, 138. — *Elisanthe noctiflora* Rupr. Fl. Cauc. (1869) 201; Grossg., Fl. Kavk. II, 416. — Ic.: Sorn. rast. SSSR, II, Fig. 156, 148, t. — Exs.: Mus. Bot. Univers. Helsingfors no. 615; Fl. Gall. et Germ. exs. de C. Billot no. 1436.

Annual, glandular-shaggy; stem erect, simple or forked, 50–90 cm long; lower leaves oblong-obovate, acute, petiolate; upper leaves sessile, narrowly lanceolate to oblong (3–11 cm long and 1–4 cm broad), strongly attenuate toward apex, acute; flowers rather few in a loose cyme with elongated opposite branches; calyx tubular-conic, (18)20–25 mm long and 8–9 mm broad, inflated in fruit; teeth long, subulate; petals dingy whitish or rose, one and a half times as long as calyx; limb obcordate, deeply 2-fid; coronal scales small; claw narrowly cuneate; capsule ovoid, subsessile; seeds numerous, small, brown, minutely tuberculate. June–July.

Shrub thickets and wood margins. — European part: Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., L. Don (Krasnoarmeisk), Crim.; Caucasus: Cisc., E. Transc.; W. Siberia: Ob, U. Tob. (Ishim), Irt., Alt. **Gen. distr.:** Scand. Described from Europe. Type in London.

13. *M. olgae* Maxim. in Bull. Acad. Sc. Pétersb. VII (1865) 332. — *Silene olgae* Rohrb. in Linnaea XXXVI (1870) 687; Will. in Journ. of Linn. Soc. XXXII (1896) 160; Kom., Fl. Manchzh. II, 195. — Exs.: HFR no. 2981.

713 Biennial, glandular-pubescent throughout; stem 20–30 cm long, branched; radical leaves lance-spatulate, petiolate; cauline leaves lanceolate, short-acuminate, 2–4 cm long and 8–15 mm broad, sessile; inflorescence a raceme; pedicels 0.5–1 cm long; bracts herbaceous; calyx cylindric-clavate, 8–10 mm long and 4 mm broad, glandular-pubescent; teeth acute, narrowly scarious-margined; petals dark rose or purple, one and a half times to twice as long as calyx; limb cleft to below the middle into linear lobes, sometimes with a subsidiary tooth on each margin; coronal scales reduced to bosses; claw not enlarged, ciliate; filaments glabrous; capsule 4–8 mm long, sessile; seeds triangular-reniform, sharply tuberculate, 0.75 mm long. June–July.

Stony slopes and broad-leaved woods at about 1,500 m above sea level. — Far East: Uss. Endemic. Described from the shores of Olga Bay. Type in Leningrad.

Series 5. *Aprica* Schischk. — Annuals, rarely biennials; petals equaling or slightly exceeding calyx.

14. *M. apricum* (Turcz.) Rohrb. Monogr. *Silene* (1868) 231; Kryl., Fl. Zap. Sib. V, 1080. — *Silene aprica* Turcz. ex Fisch. et Mey. in Ind. I sem. Hort. Petrop. (1835) 38; Turcz. Fl. baic.-dahur. I, 209; Ldb. Fl. Ross. I, 317. — Ic.: Acta Hort. Berg. III, 1, no. 1 (1897) 22.

Annual or biennial, covered throughout with short falcately recurved hairs; hairs; stem 30–70 cm long, erect, branched; lower leaves narrowly spatulate, tapering to a very short petiole; median leaves narrowly lanceolate, 4–7 cm long and 4–8 mm broad, sessile; upper leaves similar but smaller; inflorescence paniculate, with long ascending branches; bracts lanceolate, long-acuminate, ciliate; calyx ovoid, 9–12 mm long and 3–4 mm broad, 10-nerved; petals rose or white, equaling or very slightly exceeding calyx; limb cleft to the middle, coronate; styles 3; capsule ovoid, ca. 9 mm long, dehiscing apically by 6 teeth; carpophore 1 mm long; seeds reniform, 1.5 mm long, convex on the back, tuberculate. June–July.

Exposed southern slopes. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau., Ze.-Bu., Uss. **Gen. distr.:** Mongolia. Described from the environs of Irkutsk and from Transbaikalia. Type in Leningrad.

15. *M. firmum* (Sieb. et Zucc.) Rohrb. Monogr. *Silene* (1868) 232. — *Silene firma* Sieb. et Zucc. Abhandl. Münch. Acad. IV, 2 (1843) 166; Kom., Fl. Manchzh. II, 197. — *S. melandriiformis* Maxim. Prim. Fl. Amur. (1859) 54. — *Melandrium apricum* var. *firmum* Rohrb. in Linnaea XXXVI (1869) 240. — *Elisanthe firma* Schischk. in sched.

714 Annual, glabrous or in lower part crisp-hairy; stems solitary or 2 or 3, simple, 50–100 cm long; leaves ovate-lanceolate to lanceolate, 3–10 cm long and 0.8–2.5 cm broad, tapering to a rather long petiole, acuminate at apex, the margins ciliate; inflorescence elongate-racemiform; pedicels longer than calyx; bracts lanceolate, long-acuminate, ciliate; calyx

cylindric, 7–12 mm long, glabrous; teeth lanceolate, acute, the scarious margin ciliate; petals white, somewhat longer than calyx; limb cleft to the middle, coronate; capsule ovoid, 9–11 mm long; carpophore very short. July – August.

Pebbly riverbeds, sandy and pebbly shores, and shrub thickets. — Far East: Ze.-Bu., Uss. **Gen. distr.:** Manchuria, Korea, Japan. Described from Japan.

Subgenus 2. **GASTROLYCHNIS*** (Fenzl) Schischk. subgen. nov. — *Lychnis* sect. *Gastrolychnis* Fenzlin Endl. Gen. (1840) 974. — *Melandryum* Sect. *Gastrolychnis* Pax in Engl. u. Prantl, Natürl. Pflanzenf. 1 Aufl. III, 1 (1889) 74. — *Gastrolychnis* Rchb. Nomencl. (1841) 206. — *Gastrolychnis* Rupr. in Beitr. Pflanzenk. russ. Reich. II (1845) 24. — *Wahlbergella* Fries, Summa veg. Scandin. I (1846) 155. — *Vahlenbergella* Blytt, Norges Fl. III (1876) 107.

Calyx broadly or narrowly campanulate, broadly 5-toothed, with dark longitudinal stripes enlarged at summit and sometimes prolonged into solid blotches of same color on the teeth, considerably inflated in fruit; flowers perfect; styles 5; corolla equaling calyx or exerted to not more than half the length; petals notched or 2-fid; fruit a unilocular capsule dehiscing apically by 10 teeth. Perennial herbs of the Arctic regions and of the alpine and subalpine mountain zones. In southern Siberia and in Mongolia, some species occur also in submontane steppes and meadows and on fluviatile and lacustrine pebbles.

Economic importance. Of limited value as forage.

16. *M. longicarpophorum* Kom. in Trav. Soc. Nat. Pétersb. XXVI (1895) 132. — *Wahlbergella longicarpophora* Tolm. in litt. — *Lychnis longicarpophora* Preobr. in Sched. Herb. Inst. bot. Ac. Sc. URSS.

715 Perennial; stems slender, erect, slightly pubescent, 8–30 (mostly 12–20) cm long; leaves rather densely covered with short white hairs or glabrate; radical oval, slightly attenuate at base, subacuminate at apex, 2–8 cm long and 4–12 mm broad; cauline mostly 2 pairs, of these the lower lanceolate, slender-pointed, somewhat shorter and much narrower than the radical, those of the upper pair very small, cuneate; flowers solitary, rarely 2 or 3, erect; calyx elongate-campanulate, with dark grayish-lilac striped and almost completely dark teeth somewhat tapering toward apex, or [?] more sparsely covered with very short hairs, 17–20 mm long at anthesis; corolla lilac, much narrower than calyx, exerted to one-third or half its length; petals 2-fid. (Plate XLIV, Figure 9).

Alpine zone of Soviet Central Asia, mostly at altitudes between 2,500 and; 3,000 m. — Centr. Asia: Pam.-Al. Endemic. Described from the limestone area of Zeravshan. Type in Leningrad.

17. *M. soczavianum* Schischk. in Journ. Soc. Bot. Russ. Leningr., 16 (1931) 83. — *Wahlbergella soczaviana* Tolm. in litt. — Ic.: Schischk., l. c., p. 84.

Perennial; stems slender, soft-hairy or in lower part glabrous, 9–17 cm long; radical leaves elongate-obovate, obtuse to subacuminate, covered on

* Treatment by A. I. Tolmachev.

upper surface and on the margin with short pale hairs, glabrous beneath, 1–2.5 cm long and 2.5–8 mm broad; cauline leaves 2–4 pairs, narrower than the radical, those of the upper pairs smaller, subacuminate; flowers erect or slightly deflexed; calyx broadly campanulate, with lilac stripes and teeth, covered with short glandular hairs, 10–12 mm long at anthesis; corolla one and a half times as long as calyx, bright violet-red; petals broad, deeply notched.

Wet tundras. — Arctic: An. Endemic. Described from the Anadyr River basin. Type in Leningrad.

18. *M. sordidum* (Kar. et Kir.) Rohrb. in Linnaea, XXXVI (1869–70) 233. — *Lychnis sordida* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 170. — *Wahlbergella sordida* Tolm. in litt. — *Gastrolychnis sordida* Schischk. in sched. ad Herb. Inst. bot. Ac. Sc. URSS.

Perennial; stems erect, more or less covered with short pale hairs, in lower part sometimes glabrate, 30–45 cm long; leaves slightly pubescent or glabrous, the radical elongate-oblongate, subacuminate, 5.5–8.5 cm long and 6–11 mm broad, the cauline 2–4 pairs, narrowly lanceolate, the lower approaching the size of the radical, the upper smaller, the uppermost very small, cuneate; flowers 2–7, exceptionally solitary, rather close to the stem end, partly forming compact closed groups, erect or subcernuous at anthesis; pedicels slender, much shorter than calyx; calyx broadly campanulate, 17–23 mm long, with dark lilac stripes and teeth, covered with short pale hairs; corolla blackish-lilac, one-quarter longer than calyx; petals relatively narrow, 2-fid. (Plate XLIV, Figure 6).

Subalpine meadows. — Centr. Asia: Dzu.-Tarb. (Dzhungarian Ala-Tau). Endemic. Described from Sarkhan (Dzhungarian Ala-Tau). Type in Moscow.

16 19. *M. triste* (Bge.) Fenzl in Ldb. Fl. Ross. I (1842) 326; Kryl., Fl. Zap. Sib. V, 1077. — *Lychnis tristis* Bge. in Ldb. Fl. Alt. II (1830) 184. — *Gastrolychnis tristis* Rupr. Fl. samojed. cisur. (1845) 31. — *Wahlbergella tristis* Freyn in Oest. Bot. Zeitschr. XLV (1895) 266.

Perennial; stems erect, firm, rather densely short-hairy, 15–35 cm long; radical leaves elongate-obovate, subacuminate, with puberulent margin, 4–10 cm long and 7–13 mm broad; cauline leaves 2 or 3 pairs, the lower resembling the radical but sometimes slightly larger, the upper very small, narrowly cuneate; flowers solitary or 2 or 3 together on upper part of stem (but not forming a closed group); pedicels long, nodding at anthesis; calyx broadly campanulate, at anthesis 17–23 mm long, glandular-pubescent, with blackish-lilac stripes and teeth, strongly inflated in fruit; corolla lilac or blackish-purple, slightly exserted; petals 2-fid; seeds wingless, tuberculate. June–July. (Plate XLIV, Figure 5).

Alpine meadows, near mountain streams, and on the periphery of sylvestrine associations. — W. Siberia: Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Dzu.-Tarb., T. Sh. **Gen. distr.:** Mong. Described from Altai. Type in Leningrad.

20. *M. apetalum* (L.) Fenzl in Ldb. Fl. Ross. I (1842) 326; Kryl., Fl. Zap. Sib. V, 1075. — *Lychnis apetala* L. Sp. pl. ed. I (1753) 437. — *L. uniflora* Ldb. in Mém. Ac. Pétersb. V (1815) 536. — *Agrostemma apetalum* Don.,



PLATE XLIV. 1. *Melandrium affine* Vahl: aspect, hairs from pedicel. — 2. *M. apetalum* (L.) Fenzl: general view of flower, calyx, 2a seed. — 3. *M. angustiflorum* (Rupr.) Walp.: calyx, analysis of corolla. — 4. *M. tenellum* Tolm.: seed. — 5. *M. triste* (Bge.) Fenzl: calyx. — 6. *M. sordidum* (Kar. et Kir.) Rohrb.: upper portion of stem with flowers. — 7. *M. brachypetalum* (Horn.) Fenzl: calyx, seed. — 8. *M. saxatile* (Turcz.) A.Br.: flowering calyx, fruiting calyx, seed. — 9. *M. longicarpophorum* Kom.: calyx.

Enc. I (1831) 416. — *Lychnis parviflora* Turcz. ex Bess. in Flora XVII, I Beibl. (1834) 8. — *Wahlbergella apetala* Fries in Lindbl. Bot. Notis. (1843) 9. — *W. uniflora* Fries in Bot. Notis. (1843) 143. — *W. vel Gastero-lychnis uralensis* Rupr. Fl. samojed. cisural. (1845) 30. — *W. vel G. macropetala* Rupr., ibid. (1845) 30. — *Physolychnis gonosperma* Rupr. in Mém. Ac. Pétersb. VII sér., XIV, no. 4 (1864) 41. — ? *L. pauciflora* Ldb. in Mém. Ac. Pétersb. V (1815) 537.

Perennial; stems erect, 7–30 (usually not more than 20) cm long, monanthous, mostly pubescent, in upper part glandular; leaves narrow, linear-lanceolate, the radical often somewhat enlarged near apex, 1.5–6 (9) cm long, subacuminate or obtuse, glabrous or slightly pubescent at margin or puberulent throughout; cauline leaves 1–3 pairs, much smaller than the radical, narrow, subacuminate; flowers solitary, exceptionally 2 or 3, each distinctly pedicellate, drooping, erecting in fruit; calyx broad, commonly inflated, ovoid-campanulate, 13–18 mm long, with blackish or blackish-raspberry-colored longitudinal stripes, glandular-pubescent, more rarely glabrous; petals dingy lilac, included in calyx or scarcely exerted and then with reflexed tips, notched; seeds smooth, broadly membranous-margined. June – August. (Plate XLIV, Figure 2).

Wet tundras and alpine mountain formations. — Arctic: Arc. Eur. (W. Murman and Bol'shezemel'skaya Tundra), Nov. Z. (greater part of Novaya Zemlya), Arc. Sib., Chuk., An.; European part: V.-Kama (N. Ural, at 60° N. lat.); W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Kamch., Okh.; Centr. Asia: Dzu.-Tarb., Pam.-Al., T. Sh. Gen. distr.: Arc., Scand., Dzu.-Kash., Mong., Ber., N. Am., Tib. Described from Lapland. Type in England.

Note. *M. apetalum* (L.) Fenzl displays considerable variability over its distribution area but it does not apparently form stable geographic races. Arctic plants are generally characterized by their scantily pubescent and often quite glabrous leaves, the cauline leaves being poorly developed, often rudimentary. Altai plants, on the other hand, are distinguished by the strong development of minute farinaceous indument and often bear 3 pairs of cauline leaves. Sayan plants show intermediate features. The characters indicated are not, however, fully consistent.

21. *M. affine* J. Vahl, Fl. Dan., 40 (1843) 5. — *M. involucreatum* β affine Rohrb. in Linnaea, XXXVI (1869–70) 217 (p. max. pte.). — *Lychnis affinis* J. Vahl in Fries, Mant. III (1842) 36. — *Wahlbergella affinis* Tolm. in litt. — *Gastrolychnis affinis* Schischk. in sched. ad Herb. Inst. bot. Ac. Sc. URSS. — Ic.: Tolm. in Trav. Mus. Ac. Sc. XXIV, fig. 2.

Perennial; stems erect, rather densely covered with short pale hairs, more rarely subglabrous, 5–20 cm long; radical leaves elongate-oblancheolate to linear-cochleariform, covered, especially at margin, with short pale hairs, 1.5–4.5 cm long and 2–5 mm broad; cauline leaves 1 or rarely 2 pairs, oblong, about as broad throughout but shorter than the radical, with similar indument; flowers solitary, more rarely 2 or 3 in a tight group, erect; calyx campanulate, 7–14 mm long at anthesis, markedly inflated in fruit, with blackish longitudinal stripes, densely glandular-pubescent; corolla white; petals notched, one-third longer than calyx; seeds narrow-rounded, scarcely wrinkled. July – August. (Plate XLIV, Figure 1).

Dry clayey, clay-and-sand, and sometimes moderately moist mossy tundras. — Arctic: Nov. Z. (Novaya Zemlya at 74.5°N.), Arc. Sib. (to the east of Yenisei, in isolation on Vaigach Island and the Arctic Urals), An. **Gen. distr.:** Arc., Ber., N. Am. Described from Greenland. Type in Denmark.

Note. A variety occurring over a considerable part of the distribution area, side by side with the typical form, is var. *macranthum* A. Tolm. which is characterized by its enlarged calyx (somewhat inflated even at anthesis) and larger flowers. An additional variety found in Taimyr is var. *caespitosum* A. Tolm. which forms larger compact mats and more numerous flowers (2 or 3) irrespective of the small size of the plant.

22. *M. angustiflorum* (Rupr.) Walp. Annal. I (1848–49) 93. — *Wahlbergella angustiflora* Rupr. Fl. samojed. cisur. (1845) 24. — *Gastero-lychnis angustiflora* Rupr., *ibid.*, 24. — *W. vel G. Vahlia* Rupr., *ibid.*, 24. — *W. affinis* Fries, Summa veg. Scand., I (1846) 155. — *Melandryum involucratum* α *angustiflorum* Rohrb. in Linnaea, XXXVI (1869–70) 216. — *M. affine angustiflorum* A. Tolm. in Trav. Mus. Bot. Ac. Sc. XXIV (1932) 258. — *M. affine* Kryl., Fl. Zap. Sib. V, 1078, non J. Vahl. — Ic.: Tolm., l. c., fig. 3.

Perennial; stems erect, rather densely covered with short pale hairs, 8–25 cm long; narrow, rather densely pubescent, the radical 2–4 cm long and not more than 3–4 mm broad, sometimes slightly enlarged near apex, the cauline 2 or 3 pairs, linear, the lower as long as or longer than the radical; flowers solitary, erect, more rarely in tight groups of 2 or 3; calyx narrowly campanulate, dark-striped, 9–12 mm long at anthesis, both calyx and pedicel densely covered with short glandular hairs; corolla narrow; petals white, more rarely roseate, exceeding calyx by one-third, shallowly notched; seeds narrow-rounded, very scarcely wrinkled. July. (Plate XLIV, Figure 3).

Slopes and dry exposed tundra sites, mostly on sandy ground. — Arctic: Arc. Eur. (Kanin, Kolguev, Pripecherskie tundras), Arc. Sib. (West of Yenisei). **Gen. distr.:** Scand. (border between Finmarken and Swedish Lapland). Described from Kolguev Island. Type in Leningrad.

Note. Markedly different in its typical form from *M. affine* J. Vahl, *M. angustiflorum* is linked to that species by a transitional form, var. *intermedium* A. Tolm. which has normally two pairs of stem leaves, while flower shape is intermediate between the two species. This variety occurs in Yugorski Shar, and generally on Pai-Khoi, but mainly in the Gidanskaya Tundra, i. e., in locations situated between the main part of the distribution area of *M. angustiflorum* and the area occupied by *M. affine*.

23. *M. tenellum* Tolm. comb. nova. — *Melandryum affine tenellum* A. Tolm. Trav. Mus. Bot. Ac. Sc., XXIV (1932) 258–260.

Perennial; stems erect, slender, scarcely pubescent, 20–40 cm long; leaves slightly pubescent, narrow, the radical linear-oblongate, 2.5–5 cm long and to 2–5 mm broad, the cauline 2 or 3 pairs, the lowest pair often longer than the radical; flowers 2 or 3 together, erect; calyx narrowly

campanulate, glandular pubescent, with grayish-green or blackish stripes, 9–12 mm long at anthesis, somewhat inflated in fruit; corolla narrow, white or pale rose, slightly exceeding calyx; petals strongly cleft; seeds narrow-rounded, scarcely wrinkled. June–July. (Plate XLIV, Figure 4).

Turfy slopes in forest-tundra and in northern part of the forest belt. — Arctic: Arc. Sib. (lower reaches of the Yenisei, up to 70°N., Boganid, lower reaches of the Lena, up to 71°, lower reaches of the Kolyma); E. Siberia: Yen. (north of Lower Tunguska), Lena-Kol. (to the north of the Arctic Circle, in places between the Lena and Amga rivers). Endemic. Described from the forest-tundras in the Yenisei area. Type in Leningrad.

24. **M. gracile** Tolm. in Trav. Mus. Bot. Ac. Sc. XXIV (1932) 261–262. — *Wahlbergella gracilis* Tolm. in litt. — ? *M. brachypetalum* Fenzl in Ldb. Fl. Ross. I (1842) 327 (nota). — Ic.: Tolm., l. c., fig. 6.

Perennial; stems erect, slender, 20–50 cm long, glabrate; radical leaves suboval or elongate-obovate, commonly 2–2.5 cm long and to 8 mm broad, subacuminate; cauline leaves 2 or 3 pairs, narrower, the lower much longer than the radical, with pubescent margin; flowers solitary or else 2 or 3, erect; calyx narrow, dark-striped, sparsely glandular-hairy, 8–10 mm long at anthesis; corolla white, one and a half times as long as calyx; petals deeply cleft. June–July.

E. Siberia: Yenisei. (Middle reaches of the Lower Tunguska, Chunya River — tributary of the Podkamennaya Tunguska), Lena-Kol. (Central Yakutia), Dau. (Barguzin River). Endemic. Described from Central Yakutia. Type in Leningrad.

Note. The typical form of this species occurs in Central Yakutia. A variety, var. *Korotkyi* A. Tolm., which occurs in the Yenisei basin, Barguzin district, and in the northern circuit of the Lena-Vilyui basin, differs in its much longer stem leaves, up to 6–9 cm long and 5–9 mm broad.

25. **M. taimyrense** Tolm. in Trav. Mus. Bot. Ac. Sc. XXIV (1932) 264. — *Wahlbergella taimyrensis* Tolm. in litt. — Ic.: Tolm., l. c., fig. 7.

Perennial; stems erect, white-hairy, 16–25 cm long; leaves linear, to 6 cm long and not more than 4 mm broad, subobtusate, the radical and cauline alike; flowers 2–4, rarely solitary, erect; calyx covered with glandular white hairs; corolla white or rosy-white, scarcely exerted; seeds small, wrinkled, wingless, obscurely tuberculate. July–August.

Dry tundra slopes. — Arctic: Arc. Sib. (E. part of Taimyr). Endemic. Described from the Taimyr Peninsula. Type in Leningrad.

26. **M. brachypetalum** (Horn.) Fenzl in Ldb. Fl. Ross. I (1842) 326; Kryl., Fl. Zap. Sib. V, 1076. — *M. songaricum* Fisch. et Mey. in Suppl. ad. Ind. IX sem. Horti Petrop. (1844) 14; Trautv. in Bull. Soc. Nat. Mosc. (1860) 155. — *Lychnis brachypetala* Horn. Hort. Hafn. Suppl. (1819) 51. — *Wahlbergella brachypetala* Freyn in Oest. Bot. Zeitschr. XLV (1895) 266.

Perennial; stems erect or slightly curved at the nodes, rather densely covered with pale hairs, 12–70 cm long; leaves elongate-lanceolate, acuminate; radical and lower cauline often strongly tapering in basal part, covered with short white hairs, with ciliolate margin, the radical 2–9 cm long and 3–10 mm broad; cauline 3–5 pairs, the lowest pairs equaling or slightly larger than the radical, other pairs progressively decreasing in size; flowers 2–6, borne more or less closely at the summit of the stem, erect or

deflexed at anthesis; pedicels 10–14 mm long; calyx narrowly campanulate, with dingy-green longitudinal stripes, densely covered with short white hairs, accrescent in fruit and then to 18 mm long and much inflated; corolla white or pale rose, as long as calyx or scarcely exserted; petals rather shallowly notched; seeds small, wingless, distinctly tuberculate. June–July. (Plate XLIV, Figure 7).

Dry places, slopes and pebble deposits of the subalpine zone, more rarely in the alpine zone and in riverside lowlands. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Kamch. (Kamchatka River valley), Ze.-Bu., Uss.; Centr. Asia: Dzu.-Tarb., T. Sh. **Gen. distr.:** Mong., Jap.-Chi. (Manch.). Origin unknown. Type in Denmark?

Note. This species displays in the USSR almost fully consistent characters. Larger specimens that occur in various places tend to branch in upper part of the stem. The flowers of such specimens may be to 10 mm long. A characteristic deviation from the norm occurs in plants from Ussuri Territory, as they have broader leaves, while the indument on the lower part of the plant consists of rather longer hairs.

27. *M. baicalense* (Suk.) Tolm. in Trav. Mus. Bot. Ac. Sc. XXIV (1932)
723 265. — *Lychnis brachypetala* var. *baicalensis* Sukatsch. in sched.
Herb. Inst. Bot. Ac. Sc. — *Wahlbergella baicalensis* Tolm. in litt. —
Gastrolychnis baicalensis Schischk. in sched. — Ic.: Tolm., l. c.,
fig. 8.

Perennial; stems erect, rather densely white-pubescent, 20–35 cm long; leaves elongate-lanceolate, subacuminate, rather densely covered with short pale hairs, with ciliate margin; radical 3.5–5 cm long and 5–10 mm broad; cauline commonly 3 pairs, more elongated, the lowest pair somewhat larger than the radical, the upper pairs smaller and much narrower; flowers 3–5, exceptionally solitary, in a rather dense group at the summit of the stem, nodding at anthesis; calyx lilac-toothed, oblong-campanulate at anthesis, 12–15 mm long, inflated in fruit, the calyx and pedicel covered with short pale hairs; corolla roseate, as long as calyx or slightly exserted; seeds small, wingless, tuberculate. June–July.

Shores of Lake Baikal. — E. Siberia: Ang.-Say. (N. E. shore of Lake Baikal). Endemic. Described from the shores of Lake Baikal. Type in Leningrad.

28. *M. saxatile* (Turcz.) A. Br. in Flora (1843) 371. — *Lychnis saxatilis* Turcz. in Fisch. et Mey. Ind. Sem. H. Petrop., I (1835) 32; Ldb. Fl. Ross. I, 330. — *Agrostemma saxatile* Don ex Steud. Nomencl., II (1841) 81. — *Wahlbergella saxatilis* Tolm. in litt.

Perennial; stems erect, sometimes branched in upper part, 25–40 cm long, covered with pale farinose indument; leaves only cauline in mature specimens, 4–6 pairs, the lower ovate-lanceolate, subacuminate, 4–9 cm long and 1–2 cm broad, the upper smaller and narrower, lanceolate to linear-lanceolate, farinaceous; flowers 3–8, at the summit of the stem in terminal groups of 3 and solitary lower down; calyx 11–13 mm long at anthesis, tubular-campanulate, green-striped, covered with short pale hairs, strongly inflated in fruit and widely expanded; corolla white, one-third longer than calyx; petals 2-fid; seeds relatively large, wingless, tuberculate. June–July. (Plate XLIV, Figure 8).

E. Siberia: Dau. (Shilka River). Described from the Shilka River. Type in Leningrad.

Note. This species occupies a unique position within the subgenus both in aspect and in component characters. Here one may mention the prompt wilting of radical leaves combined with the strong development of stem leaves, a feature which markedly affects the general appearance of the plant. The shape modification of the fruiting calyx also takes a different course: the inflation of the calyx, while characteristic of the whole subgenus, largely involves in other species the lower part of the calyx which thus becomes saccate, while in *M. saxatile* the fruiting calyx is widely expanded and acquires open campanulate shape.

724

Subgenus 3. **EUMELANDRIUM** (A. Br.) Schischk. — Sect. *Eumelandrium* A. Br. in Flora XXVI (1843) 371. — Plants dioecious; petals one and a half to twice as long as calyx. Biennials or rarely perennials or annuals.

29. *M. silvestre* (Schkuhr) Roehl. Deutschl. Fl. ed. I (1812) 274; Ldb. Fl. Ross. I, 327; Shishk. in Fl. Yugo-Vost. IV, 280; Kryl., Fl. Zap. Sib. V, 1079. — *Lychnis dioica* L. Sp. pl. (1753) 437, ex parte. — *L. dioica* β *rubra* Weigel, Fl. Pom.-Rub. (1769) 85. — *Lychnis silvestris* Schkuhr, Handb. I (1791) 403, t. 124; Shmal'g., Fl. I, 145. — *L. diurna* Sibth. Fl. Oxon. (1794) 145. — *Saponaria diurna* Fenzl in Endl. Gen. (1841) 974. — *Melandrium diurnum* Fries in Bot. Notis. (1842) 170. — ? *M. caspium* Grun. in Bull. Soc. Nat. Mosc. XL, 4 (1867) 407. — *M. purpureum* Rupr. Fl. Ingr. I (1860) 160. — *M. dioicum* Simonkai, Enum. Fl. Transs. (1886) 129. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 304, f. 5126; Fl. Yugo-Vost. IV, Fig. 314. — Exs.: HFR no. 860.

Biennial; stems solitary, erect or at base ascending, covered with rather long soft hairs, 40–100 cm long; leaves ovate or oblong, 5.0–7.5 cm long and and 1.5–3.0 cm broad, acute; radical with petiole equaling or longer than blade; cauline sessile, pubescent on both surfaces, with ciliate margin; inflorescence a cyme, at first contracted, finally lax; pedicels commonly shorter than calyx, often elongating in fruit; calyx ca. 10 mm long, with triangular-ovate acute teeth; fruiting calyx usually tightly enclosing capsule; petals bright red or light purple, inodorous, twice as long as calyx, the claw glabrous; capsule sessile, globular-ovoid, dehiscing by 10 equidistant reflexed teeth; seeds black, sharply tuberculate. June–July.

Woods, meadows, near fields and dwellings, gardens, and occasionally among crops. — European part: Kar.-Lap., Lad.-Ilm., Dv.-Pech., U. Dnp., M. Dnp., U. V., Crim. (in gardens); Caucasus: W. Transc.; W. Siberia: Ob, Irt.; Centr. Asia: Ar.-Casp. **Gen. distr.:** Scand., Centr. and Atl. Eur., N. Am. (introduced). Described from Germany.

Note. It has not been possible to ascertain what exactly signifies *M. caspium* Grun., as no authentic specimens have been found in the Herbarium of the Botanical Institute. Neither did more recent collections from the Baku area include any representatives of the genus *Melandrium* with red petals.

30. *M. balansae* Boiss. Fl. Or. Suppl. (1888) 109; Som. et Lev. in A. H. P. XVI (1900) 77; Grossg., Fl. Kavk. II, 417; Shishk., Sorn. rast. SSSR II, 202.

Biennial; stems 50–90 cm long, arising laterally from the basal rosette, puberulent as are the leaves; leaves obovate or oblong, 4–7 cm long and 1.5–3 cm broad, acute, the basal tapering to fairly long petiole, the cauline sessile; flowers solitary, the plants dioecious; inflorescence at first rather compact, finally more loose; pedicels commonly as long as calyx, elongating in fruit; calyx glandular-viscid and covered with simple patulous hairs, 12–20 mm long, in staminate flowers tubular-campanulate, in pistillate flowers ovoid; fruiting calyx not inflated, tightly enclosing the capsule; capsule ovoid, with 10 erect teeth. June–July.

Open woods, wood margins, coppices, field borders, and roadsides. — Caucasus: Gr. Cauc. (W. part), W. Transc. Gen. distr.: Lazistan. Described from Lazistan (Rize). Type in Geneva.

Economic importance. Of low value as forage plant; avoided by livestock.

31. *M. album* (Mill.) Garcke, Fl. Deutschl. 4 Aufl. (1858) 55; Shishk. in Fl. Yugo-Vost. IV, 281; Kryl., Fl. Zap. Sib. V, 1074. — *Lychnis dioica* β et γ L. Sp. pl. (1753) 436. — *Lychnis alba* Mill. Gard. Diet. ed. 8 (1768) no. 4. — *L. arvensis* Schkuhr, Handb. I (1791) 403. — *L. vespertina* Sibth. Fl. Oxon. (1794) 146. — *Melandryum pratense* Roehl. Deutschl. Fl. 2. Aufl. I (1812) 274; Ldb. Fl. Ross. I, 327. — *Saponaria vespertina* Fenzl in Endl. Gen. (1841) 974. — *Melandryum vespertinum* Fries in Bot. Notis. (1842) 170. — *M. dioicum* Coss. et Germ. Fl. Par. ed. I (1845) 28. — Ic.: Sorn. rast. SSSR II, Fig. 157.

Annual or biennial; stem pubescent in lower part, covered above with soft glandular hairs, erect, branched, 40–100 cm long; lower leaves elliptic, petiolate; upper leaves sessile, acuminate, 4–5 cm long and 1–2.5 cm broad; flowers unisexual, the plants dioecious; inflorescence rather compact at first, becoming looser; calyx glandular-viscid and covered with simple patulous hairs, 15–20 mm long, in staminate flowers tubular-campanulate, 10-nerved, in pistillate flowers broad-ovoid, 20-nerved; fruiting calyx inflated at the middle, attenuate at summit; petals white; limb deeply 2-fid; coronal scales to 2 mm long; capsule ovoid, with 10 erect teeth, 1.5 cm long and 1.2–1.5 cm broad; seeds reniform, 1.5 mm long and 1 mm broad, grayish, covered with concentrically arranged stellate-based tubercles. June–August.

Meadows, fallows, canal banks, gardens, and among spring crops. — Nearly all European part, except Arctic; Caucasus: Cisc.; W. and E. Siberia: except the alpine zone; Far East: Ze.-Bu., Uss.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb. Gen. distr.: nearly all W. Eur., Mong., N. Am. (introduced), Greenland.

32. *M. boissieri* Schischk. in Fl. Tphilisiensis I (1925) 205. — *M. divaricatum* Fenzl in Ldb. Fl. Ross. I (1842) 328, non *Lychnis divaricata* Rchb. (1826). — *Lychnis macrocarpa* Cosson in Bull. Soc. bot. France III (1856) 23. — *Melandryum macrocarpum* St. Supery ex Boiss. Fl. Or. I (1867) 660, non Wilk. — *M. pratense* β capsula elongata Boiss., l. c. (1867).

Biennial or perennial; stem 40–80 cm long, pubescent, forked at summit; lower leaves petiolate, ovate, 3–7 cm long and 2–3 cm broad; upper leaves ovate-lanceolate, acuminate; inflorescence a rather loose cyme; flowers solitary; plants dioecious; calyx in staminate flowers inflated, 14–15 mm long and 5–7 mm broad, in pistillate flowers 15–16 mm long; fruiting calyx

to 25 mm long and 16 mm broad, widely expanded, not attenuate; petals white; limb deeply 2-lobed; coronal scales oblong, to 2 mm long; capsule pyriform, dehiscent by 10 reflexed teeth, 17 mm long and 9 mm broad. June–August.

Scrub and turf slopes. — European part: Crim.; Caucasus: E. and S. Transc. **Gen. distr.:** Arm.-Kurd., Iran (?). Described from Transcaucasia (Baku ? Lenkoran?). Type in Tbilisi.

33. *M. astrachanicum* Pacz. in Zap. Kievsk. Obshch. Estestv. XII, 1 (1892) 107. — *M. album* var. *astrachanicum* Schischk. in Fl. Austroorientis URSS IV (1930) 281.

Perennial or biennial; stem pubescent, 12–40 cm long, erect, branched; lower leaves oblong, petiolate, middle cauline leaves lanceolate to narrowly lance-ovate, 3–3.5 cm long and 5–7 mm broad; flowers solitary in a loose inflorescence; plants dioecious; calyx ca. 10–15 mm long, covered with simple (not glandular) hairs; fruiting calyx somewhat inflated; petals white; limb deeply 2-fid, coronate; capsule ovoid, with spreading or reflexed teeth. April–May.

Wet meadows and slopes. — European part: L. V. Endemic. Described from the environs of Astakhan and Krasny Yar. Type in Leningrad.

Genus 491. **PETROCOMA** * RUPR.**

Rupr. Fl. Cauc. I (1869) 200.

Flowers perfect; calyx tubular; petals with 2-fid limb; stamens 10; styles 3; capsule subglobose, unilocular. Perennial herbs; stems decumbent, mostly numerous; leaves rather small, opposite; seeds black, shining, very slightly inflated, prominently ridged near the hilum.

729

1. *P. hoefftiana* (Fisch.) Rupr. Fl. Cauc. in Mém. l'Acad. Imp. des Sc. de Pétersb. VII Sér. V (1869) 200; Grossg., Fl. Kavk. II, 415. — *Silene hoefftiana* Fisch. in C. A. M. Verzeichn. Cauc. (1831) 215; Boiss. Fl. Or. I, 654; Shmal'g., Fl. I, 139. — Ic.: Rchb. Ic. Fl. Germ. VI (1844) f. 5021.

Perennial, woolly-pubescent and densely covered with patulous white hairs; stems profusely branched, procumbent, 20–25 cm long; leaves ovate, acute, 1–3 cm long and 5–25 mm broad, short-petioled, the lower lanceolate, with longer petiole; flowers solitary or in few-flowered cymes; pedicels equaling or shorter than calyx; calyx tubular, enlarged at summit, more or less inflated in fruit, 9–10 mm long and 3 mm broad, heavily pubescent, with ovate obtuse teeth; petals white, with linear-cuneate 2-lobed limb, ecoronate. July. (Plate XLV, Figure 6).

Shaded rocks in the alpine zone. — Caucasus: Cisc. Endemic. Described from the Caucasus, from the Berezovka River near Kislovodsk. Type in Leningrad.

* Treatment by S.G. Gorshkova.

** From Greek *petra*, rock, and *coma* o, densely covered with leaves, as the plants form a dense cover on rocks.



PLATE XLV. 1. *Viscaria viscosa* (Scop.) Aschers. - 2. *V. alpina* (L.) G. Don., portion of flower. - 3. *Velezia rigida* L. - 4. *Lychnis chalconica* L., pistil, stamen. - 5. *Cucubalus bacifer* L. - 6. *Petrocoma hoefftiana* (Fisch.) Rupr. - 7. *Melandrium akinfievii* (Schmalh.) Schischk.

Genus 492. **CUCUBALUS** * L.**

L. Sp. pl. (1753) 414.

Flowers perfect, pendulous, in cymes; calyx short-campanulate, with 5 large teeth, more or less inflated in fruit; petals 5, 2-lobed, gradually narrowing toward base; stamens 10; styles 3; fruit globose, sessile, 1-celled. Perennial plants, short-hairy, with a long profusely branched stem; leaves ovate to ovate-lanceolate, acuminate.

1. *C. baccifer* L. Sp. pl. (1753) 414; Ldb. Fl. Ross. I, 333; Shmal'g., Fl. I, 143; Kom., Fl. Manchzh. II, 205; Shiskin in Fl. Yugo-Vost. IV, 295; Grossg. Fl. Kavk. II, 417; Kryl., Fl. Zap. Sib. V, 1083. — *Silene baccifera* L. Sp. pl. ed. II (1762) 700. — *Cucubalus baccifer* var. *japonicus* Miq. Prol. fl. Japon. (1866–67) 142; Kom. and Alis., Opr. rast. Dal'nevost. kr. I, 149. — Ic.: Fl. Yugo-Vost., l. c., and Alis., lc.; Kom., tab. 149, f. IV (var. *japonicus*). — Exs.: Herb. normale edit. ab l. Dörfler no. 4834; Dr. A. v. Hayek. Fl. stiriaca exs. no. 620 et no. 621; Fl. Gall. et Germ. exs. de Billot no. 1432; Fl. Gall. et Germ. exs. no. 620.

Perennial; stem 50–200 cm long, ascending or decumbent, branched; branches opposite, spreading, 5–15 cm long; leaves ovate to ovate-lanceolate or oblong, acute, entire, 1.5–9 cm long and 0.5–3 cm broad, short-petioled; flowers solitary, axillary, in rather loose leafy inflorescences; calyx yellowish-green, short-campanulate, 8–15 mm long and 4–6 mm broad, herbaceous, with ovate-triangular acute teeth; petals greenish-white, narrow. June–August. (Plate XLV, Figure 5).

Damp places among shrubs, shady woods, gardens, and shores of rivers and meadow banks. — European part: Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don. L. V.; Caucasus: Cisc., Dag., W. and E. Transc.; W. Siberia: U. Tob.; Far East: Uss.; Centr. Asia: Ar.-Casp. Gen. distr.: Centr. Eur., Iran, Ind.-Him., Jap.-Chi. Described from Europe. Type in London.

Tribe 2. DIANTHEAE Pax in Engl. Pflzr. 1 Aufl. III, 1 B (1889) 74. — Caryophyllaceae Subdiv. Diantheae Rchb. Handb. (1837) 298. — Sileneae Trib. Diantheae A. Br. in Flora XXXVI (1843) 377. — Styles 2; fruit a capsule, many-seeded or else 1- or 2-seeded, dehiscing apically by teeth or valves or splitting transversely; calyx without commissural nerves; corolla contorted to the right or imbricate in bud.

Key to Genera

1. Calyx inflated at base, strongly contracted at summit, prominently 5-angled, the angles expanded into wings; capsule incompletely 4-loculed 497. *Vaccaria* Medic.
- + Calyx tubular or campanulate, very rarely somewhat inflated, wingless; capsule unilocular 2.
2. Calyx subtended by 1–3(4) pairs of scalelike bracts; seeds flat, discoid 3.
- + Calyx ebracteate; seeds commonly reniform 5.

* Treatment by S.G. Gorshkova.

** Distortion of *cacobolus*, from Greek *cacos*, bad, wrong, and *bolos*, stroke.

3. Calyx teeth acute, very rarely (in *D. polymorphus* M. B.) obtuse; petal limb usually dentate or fringed, very rarely entire 498. *Dianthus* L.
 + Calyx teeth obtuse 4.
 4. Flowers long-pedicel, in a loose inflorescence; petals roseate 494. *Tunica* Scop.
 + Flowers sessile, in a compact head; petals reddish-lilac 495. *Kohlruschia* Kunth.
 5. Capsule membranous in lower part, 1- or 2-seeded, irregularly circumscissile; leaves often subulate-spinescent; plants commonly spherical-bushy 496. *Acanthophyllum* C. A. M.
 + Capsule many-seeded, dehiscing apically by 4 teeth; leaves not spinescent (c.f. *Gyps. popovii* Preobr.) 6.
 731 6. Calyx narrowly cylindric, prominently 15-nerved, with 5 subulate teeth; petals long-clawed; limb very small, 2-lobed, with few hairs at base; flowers subsessile 500. *Velezia* L.
 + Calyx campanulate or tubular, 5-nerved or obscurely many-nerved; petals glabrous at base or coronate 7.
 + ecoronate, gradually tapering to the claw 8.
 + Calyx not membranous between the nerves; petals commonly coronate, abruptly contracted into the claw 499. *Saponaria* L.
 8. Calyx elongate-campanulate, 5-ribbed; seeds discoid, centrally attached 494. *Tunica* Scop.
 + Calyx campanulate, ribless; seeds reniform, laterally attached 493. *Gypsophila* L.

Genus 493. **GYPSOPHILA** * L.

L. Nov. pl. gen. (1751) 41; Sp. pl. (1753) 406.

Calyx campanulate, obconic-tubular or (rarely) cylindric, 5-toothed or deeply 5-parted, 5-nerved, membranous between the nerves; petals 5, white, pink, or purple, entire or deeply 2-fid, the limb gradually or (rarely) abruptly attenuate to the claw; stamens 10; styles 2; capsule unilocular, globose or ovoid, rarely oblong, dehiscing to the middle or beyond into 4 valves; seeds reniform or rounded-reniform. Perennials or annuals, more rarely undershrubs, with sessile leaves.

1. Plants very densely pulvinate; leaves imbricate, 1-2 mm long . . . 2.
 + Plants different from above 3.
 2. Flowers on flowering shoots usually solitary; calyx 2-3 mm long, with obtuse teeth; petals entire, ca. 4 mm long 9. *G. aretioides* Boiss.
 + Flowers on flowering shoot 1-4; calyx 3.5 mm long, with acutish teeth; petals notched, ca. 7 mm long 10. *G. imbricata* Rupr.
 3. Perennials 4.
 + Annuals 58.
 732 4. Leaves subulate, sharply spinous 59. *G. popovii* Preobr.
 + Leaves never spinous 5.

* From gypsos, gypsum, and philos, loving, literally gypsum-lover.

5. Flowers short-pediceled, in a dense spherical head; scarious bracts present at the base of the head and between individual flowers 6.
- + Flowers usually long-pediceled, in a corymbose or paniculate inflorescence; more rarely flowers solitary or in 2's or 3's or, if flowers in a head, then this without scarious bracts 9.
6. Pedicels and often calyx glandular-pubescent 7.
- + Pedicels and calyx glabrous 11. *G. capitata* M. B.
7. Petals roseate or rose-purple; calyx glandular-pubescent 14. *G. cappadocica* Boiss. et Bal.
- + Petals white; calyx glabrous 8.
8. Stem glandular-puberulent from the middle; bracts oblong, acuminate; flower heads 5–12 mm in diameter; calyx teeth entire, obtuse 12. *G. glomerata* Pall.
- + Stem viscid-glandular only just below the inflorescence; bracts obovate, erose-dentate at the rounded apex; calyx teeth unequally incised at apex 13. *G. globulosa* Stev.
9. Stems procumbent or ascending, to 80 cm long; leaves 1–2 cm broad; calyx 2–3 mm long; plants of solonetz meadow 10.
- + Stems erect, rarely procumbent and then leaves small and but 1–3 mm broad 12.
10. Plants glabrous in lower part, glandular-pubescent in forks of inflorescence 37. *G. scorzonrifolia* Ser.
- + Plants densely pubescent in lower half, glabrous in the inflorescence 11.
11. Pedicels equaling or one and a half times to twice as long as calyx; petals roseate 38. *G. anatolica* Boiss. et Heldr.
- + Pedicels capillary, 3–6 times as long as calyx; petals dark red 36. *G. trichotoma* Wend.
12. High-mountain plants 5–15 cm high, growing on rocks and stony slopes, mostly heavily pubescent, very rarely glabrous; stems trailing or more rarely erect, densely leafy; petals purple-tinged; leaves mostly small (to 15 mm long and 1–3 mm broad) 13.
- + Taller plants with erect stems or, if plants low, then differing in other characters 20.
13. Calyx 2.5–3.5 mm long 14.
- + Calyx 4–8 mm long 15.
14. Plant glabrous throughout; calyx 2.5–3 mm long; ovules 16–18 6. *G. turkestanica* Schischk.
- + Plant pubescent throughout; calyx 3–3.5 mm long; ovules 10–12 5. *G. microphylla* (Schrenk) Fenzl.
15. Pedicels 0.5–1.5 mm long; inflorescence capitate; calyx cut to one-fifth or one-fourth 16.
- + Pedicels 3–20 mm long; inflorescence loose; calyx cut to the middle or beyond 17.
16. Hairs in inflorescence glandular; leaves linear, 0.5–1 mm broad; flowers dark purple 8. *G. antoninae* Schischk.
- + Hairs in inflorescence simple; leaves spatulate, 1–3 mm broad; flowers whitish 7. *G. herniarioides* Boiss.
17. Leaves linear-subulate, cuneate toward base, with revolute margins, ca. 1 mm broad 4. *G. desertorum* (Bge.) Fenzl.

- + Leaves flat, elliptic or lance-linear, 2–3 mm broad 18.
18. Ovary 24-ovuled. Plants of S. W. Transcaucasia 1. *G. glandulosa* Boiss.
- + Ovary 14–16-ovuled. Plants of Siberia and Far East 19.
19. Stems trailing, 20–30 cm long; pedicels 14–20 mm long; seeds muricate. Plants of the Altai-Sayany region 3. *G. sericea* (Ser.) Fenzl.
- + Stems ascending, 5–10 cm long; pedicels 5–10 mm long; seeds finely striate. Plants of the Far East. . . 2. *G. violacea* (Ldb.) Fenzl.
20. Roots tuberous (Centr. Asia) 21.
- + Roots not tuberous 22.
21. Calyx 3 mm long 58. *G. intricata* Franch.
- + Calyx 7–10 mm long 57. *G. bucharica* B. Fedtsch.
22. Plants covered in the inflorescence with simple or glandular hairs (these sometimes inconspicuous and confined to the inflorescence branches) or plant heavily pubescent throughout 23.
- + Plants always glabrous throughout. 42.
23. Calyx covered with long simple as well as glandular hairs 24.
- + Calyx glabrous or farinose 29.
24. Calyx 4–7 mm long, covered at least in upper part with long patulous simple or glandular hairs 25.
- + Calyx 2–4 mm long 26.
25. Stem 30–40 cm long, glabrous in lower part, covered above with long patulous hairs; leaves oblong-lanceolate, 0.7–1.5 cm broad; calyx covered with simple hairs; petals yellowish-white 55. *G. hispida* Boiss.
- 734 + Stems 40–80 cm long; long-hairy from base; leaves 1–3 cm broad; calyx glandular-hairy; petals roseate 56. *G. fedtschenkoana* Schischk.
26. Calyx 2–2.5 mm long 27.
- + Calyx 3.5–4 mm long 28.
27. Calyx densely covered with stiff simple hairs; leaves linear, 0.5–1 mm broad *31. *G. ericalyx* Boiss.
- + Calyx covered with glandular hairs; leaves oblong-elliptic or lanceolate, 6–20 mm broad 39. *G. yorae* Woron.
28. Stems forking from base, 15–20 cm long, glabrous in lower part; leaves lanceolate or linear-lanceolate, 2–6 mm broad 35. *G. glauca* Stev.
- + Stems 70–80 cm long, with ascending branches, densely glandular-pubescent from base; leaves ovate-lanceolate, 2.5–4 cm broad 40. *G. robusta* Grossh.
29. Leaves 1–2.5 mm broad 30.
- + Leaves 3–20 mm broad 33.
30. Calyx ca. 2 mm long 31.
- + Calyx 3–4.5 mm long 32.
31. Pedicels 2–6 mm long 15. *G. fastigiata* L.
- + Pedicels filiform, 8–20 mm long 28. *G. szowitsii* Fisch. et Mey.
32. Stems 5–20 cm long; radical leaves 1–5 cm long; inflorescence corymbiform 43. *G. uralensis* Less.

- + Stems 30–50 cm long; radical leaves 5–15 cm long; inflorescence
paniculate 34. *G. meyeri* Rupr.
- 33. Flowers in a dense, mostly solitary head. High-mountain plants
of Altai and Centr. Asia 24. *G. cephalotes* (Schrenk) Will.
- + Flowers in a loose inflorescence or, if crowded in a head, then
leaves narrower 34.
- 34. Calyx 1.5–2 mm long 35.
- + Calyx 3.5–4 mm long 41.
- 35. Pedicels filiform, 10–20 mm long 27. *G. diffusa* Fisch. et Mey.
- + Pedicels 2–8 mm long 36.
- 36. Calyx 1.5–2 mm long; leaves obtuse; ovary containing 4–12(14)
ovules 37.
- + Calyx 2.5–3 mm long; leaves acute; ovary containing 14 or 15
ovules 40.
- 37. Leaves 3–4 mm broad; plants with numerous densely leafy
sterile radical shoots 22. *G. litwinowii* K.-Pol.
- + Leaves commonly broad; plants without such radical shoots 38.
- 38. Pedicels 5–8 mm long; inflorescence loose; ovary 4–6-ovuled
. 22. *G. krascheninnikovii* Schischk.
- + Pedicels 2–5 mm long; inflorescence more or less compact;
ovary 8–16-ovuled 39.
- 39. Capsule broad-ovoid, 3–3.5 mm long; seeds striate, without
tubercles 21. *G. tianschanica* M. Pop. et Schischk.
- + Capsule globose, 2–2.5 mm long; seeds muricate
. 20. *G. altissima* L.
- 40. Calyx densely whitish-farinose; leaves to 1 cm broad
. 26. *G. albida* Schischk.
- + Calyx not farinose; leaves 4–7 mm broad 19. *G. ucrainica* Kleop.
- 41. Leaves 3–10 mm broad, lanceolate to lance-linear, 3-veined;
flowers in corymbs forming a panicle; calyx 3.5 mm long
. 32. *G. acutifolia* Fisch.
- + Leaves 1–3 mm broad, linear, 1-veined; flowers not disposed in
corymbs 33. *G. stevenii* Fisch.
- 42. Pedicels 1–3 mm long, flowers in a dense subcapitate
inflorescence 43.
- + Pedicels longer; inflorescences loose 45.
- 43. Short leafy shoots always present in the axils of stem leaves.
Plants of the S. regions of the European part of the USSR
. 17. *G. dichotoma* Bess.
- + Leafy axillary shoots wanting. Plants of Soviet Central Asia and
Siberia 44.
- 44. Stem 6–15 cm long, simple or rarely with 1 or 2 branches; leaves
1–3 cm long; calyx 3.5–5 mm long 51. *G. capituliflora* Rupr.
- + Stem 30–45 cm long, with 2 or 3 branches at summit; leaves
4.5–6 cm long; calyx 5–5.5 mm long
. 52. *G. preobrashenskyi* Czernjak.
- 45. Profusely branched undershrubs 8–20 cm high; leaves scabrous on
margin and on midrib; shoots glabrous or in lower part pubescent.
Plants of S. Transcaucasia 46.

- + Plants herbaceous or woody at base and then taller; leaves usually smooth 47.
46. Leaves narrowly linear, 0.5–0.7 mm broad; calyx 3 mm long; petals notched; ovary containing 8 ovules 53. *G. lipskyi* Schischk.
- 736 + Leaves linear, 2–3 mm broad; calyx 3.5–4.5 mm long; petals rounded at apex 54. *G. brachypetala* Trautv.
47. Calyx 4–6 mm long; stems usually numerous, 10–40 cm long, commonly clothed at base, with remnants of dead imbricated leaves; petals twice to thrice as long as calyx 48.
- + Calyx 1.5–4 mm long; stems without remnants of imbricated leaves at base; petals commonly one and a half times as long as calyx, rarely twice or thrice length of calyx 50.
48. Stems 10–20 cm long, usually congested; inflorescence corymbose; calyx 4–5 mm long; petals pink or violet 49.
- + Stems 30–40 cm long, loosely tufted; inflorescence capitate; calyx 5–6 mm long; petals commonly white 42. *G. steupii* Schischk.
49. Calyx green, cut to one-third into ovate-triangular teeth; petals pink or pale red (Caucasus) 41. *G. tenuifolia* M. B.
- + Calyx commonly violet-tinged, cut to the middle into ovate teeth; petals rose-violet (Siberia) 44. *G. sambukii* Schischk.
50. Stems 40–100 cm long, profusely branched from base, often forming a spherical bush; lower part of stem densely puberulent; calyx 1.5–2.5 mm long; petals white, one and a half times to twice as long as calyx 51.
- + Stems 10–50(60) cm long, not forming a spherical bush, always glabrous; petals often roseate or white with violet veins 52.
51. Leaves lance-linear or lanceolate, 2.5–8 mm broad; calyx broadly campanulate, 1.5 mm long; pedicels 2–5 mm long; stigma decurrent on the style; capsule globose 18. *G. paniculata* L.
- + Leaves oblong-lanceolate, 5–17 mm broad; calyx narrowly campanulate, 1.5–2.5 mm long; pedicels 5–10 mm long; stigma terminal; capsule ovoid-globular 19. *G. bicolor* Freyn.
52. Calyx 2.5 mm long, densely white-farinose; inflorescence branches usually viscid in lower part *25. *G. simulatrix* Bornm. et Wor.
- + Calyx glabrous; inflorescence branches not viscid 53.
53. Leaves narrowly linear, 1–2 mm broad; calyx 2 mm long; pedicels thickened below the flower; petals scarcely exceeding calyx (S. Transcaucasia) 29. *G. virgata* Boiss.
- + Leaves usually broader; calyx 2–4 mm long; pedicels not thickened below the flower; petals twice to four times as long as calyx 54.
- 737 54. Stems numerous, sometimes up to 100, crowded, strict; ovary containing 3 or 4 ovules. (Centr. Asia) 30. *G. aulieatensis* B. Fedtsch.
- + Ovary containing 12–16 ovules 55.
55. Stems ascending or procumbent, 10–25 cm long; ovary containing 14 ovules (Caucasus) 56. *G. silenoides* Rupr.

- + Stems erect, 20–80 cm long 56.
56. Calyx 2–3 mm long; leaves broadly lanceolate, 1–2.5 cm broad.
Plants of the Far East 50. *G. pacifica* Kom.
- + Calyx 3–4 mm long; leaves 1–7(15) mm broad 57.
57. Leaves 3–7 mm broad, with short branchlets in the axils; pedicels
3–4 mm long; calyx teeth acutish 49. *G. dahurica* Turcz.
- + Leaves 1–5 mm broad, without sterile axillary branchlets; pedicels
5–20 mm long; calyx teeth obtuse 48. *G. patrinii* Ser.
- 58(3). Plants quite glabrous, sometimes viscid at summit 59.
- + Plants more or less pubescent 60.
59. Stem 20–50 cm long; calyx 3–3.5 mm long; petals roseate
. 45. *G. elegans* M. B.
- + Stem 8–20 cm long, the upper internodes usually viscid; calyx
1.5–2.2 mm long 47. *G. heteropoda* Freyn.
60. Calyx 2–2.5 mm long, dissected nearly to base; petals 2-cleft or
parted to below the middle 61.
- + Calyx 2.5–6 mm long, cut to one-fourth or one-third; petals entire
or notched 63.
61. Stem glandular-pubescent in lower part, glabrous above; calyx
glabrous; ovary 6-ovuled; seeds 1 mm in diameter
. 62. *G. alsinoides* Bge.
- + Plants glandular-pubescent throughout; calyx glandular-hairy; ovary
12–16-ovuled; seeds 0.5 mm in diameter 62.
62. Leaves 1–2 mm broad; pedicels 1.2 cm long
- + Leaves 6–10 mm broad; pedicels 3–7 mm long
. 61. *G. spathulifolia* (Fisch. et Mey.) Fenzl.
63. Calyx oblong-campanulate, 5–6 mm long; stems 15–80 cm long,
covered in upper part with long patulous simple hairs; leaves
broadly lanceolate, 1–2 mm broad 68. *G. porrigens* (L.) Fenzl.
- + Calyx 2.5–4 mm long; stems 5–25 cm long, covered with short simple
or glandular hairs; leaves linear or spatulate, not more than 1 cm
broad 64.
64. Stem and calyx glandular-hairy; petal limb obcuneate, gradually
738 tapering to a claw, 2-fid or entire 65.
- + Stem covered in lower part with short simple hairs, glabrous
above; calyx glabrous 67.
65. Petals 2-fid or notched; seeds ca. 0.6 mm in diameter; leaves
0.5–3 mm broad. 65. *G. floribunda* (Kar. et Kir.) Turcz.
- + Petals entire or notched; seeds 1 mm in diameter; leaves
4–9 mm broad 66.
66. Seeds smooth, striate. (Centr. Asia)
. 64. *G. filipes* (Boiss.) Schischk.
- + Seeds tuberculate. (Caucasus) 65. *G. picta* Boiss.
67. Leaves to 2.5 cm long and to 3 mm broad; calyx broadly campanulate,
enlarged at summit; petal limb pink, with dark nerves
. 63. *G. muralis* L.
- + Leaves to 1.5–1.7 cm long and to 1 mm broad; calyx tubular, not
enlarged at summit; petal limb white, with a very small pink spot,
narrowly cuneate or linear, gradually passing into a claw
. 64. *G. stepposa* Klok.

Subgenus 1. **ROKEJEKA** (Forsk.) Graebn. in Asch. et Graebn. Synops. V, 2 (1921) 235. — Gen. *Rokejeka* Forsk. Fl. aegypt. arab. (1775) 90. — Calyx short, turbinate or campanulate; petal claw without constriction, gradually enlarged into an entire or scarcely emarginate limb; placenta mostly elongated; radicle short, not prominent in seed. Perennials, very rarely annuals.

Section 1. **HETEROCHROA** (Bge.) Schischk. — Gen. *Heterochroa* Bge. in Ldb. Fl. Alt. II (1830) 131. — Flowers few, axillary or terminal, with herbaceous bracts; petals commonly roseate or red on one side, whitish-green on the other. Low plants with procumbent or more rarely erect stems and small leaves.

Series 1. **Glandulosae** Schischk. — Plants commonly densely pubescent; calyx broadly campanulate, 4–6 mm long.

1. *G. glandulosa* (Boiss.) Walp. Rep. II, Suppl. I, (1843) 774; Boiss. Diagn. Pl. or. nov. I, 8 (1849) 59; Fl. Or. I, 539; Grossg., Fl. Kavk. II, 420. — *Heterochroa glandulosa* Boiss. Diagn. I, 1 (1842) 15.

739 Perennial, densely covered throughout with short glandular hairs; stems ascending or procumbent, branched, 10–20 cm long; lower leaves spatulate, others elliptic or oblong-linear, 6–10 mm long and 2–3 mm broad, obtuse; short leafy shoots present in the axils of lower leaves; flowers terminal and axillary, solitary; pedicels pubescent, 7–10 mm long, usually equaling or one and a half times as long as calyx, recurved after flowering; calyx short-campanulate, 5–6 mm long, densely glandular-pubescent; teeth triangular, acute, more than half length of calyx; petals rose-purple, cuneate, notched, one and a half times as long as calyx; ovary 24-ovuled; capsule rounded; seeds reniform, tuberculate. July–August.

Stony taluses in the alpine and subalpine zones. — Caucasus: W. Transc. (Karchkhalski massif, Salachurski range, Hakry River). Gen. distr.: Pontiiski range and former Artvin district. Described from mountains of Lazistan. Type in Geneva.

2. *G. violacea* (Ldb.) Fenzl in Endl. Gen. pl. I (1836–1840) 972; Ej. in Ldb. Fl. Ross. I, 291; Kom., Fl. Manchzh. II, 205. — *Arenaria violacea* Ldb. in Mem. Acad. Pétersb. V (1815) 533. — Ic.: Ldb. Ic. Fl. Ross. V, t. 416.

Perennial, tufted; flowering stems ascending, 5–10 cm long, puberulent; lower leaves elliptic; middle and upper leaves ovate or lanceolate, 8–10 mm long and 2–4 mm broad, sessile, glabrous; inflorescence a loose corymb; pedicels 5–10 mm long, glandular-pubescent; calyx broadly campanulate, 5–6 mm long, glandular-pubescent; teeth obtusish, more than half length of calyx; petals lilac or white, purple-nerved, one and a half times to twice as long as calyx, all turning lilac after flowering; ovary 14-ovuled; capsule equaling calyx; seeds rounded-reniform, black, striated, ca. 1.5 mm in diameter. End of June, July–August.

Rocks, stony and gravelly slopes, and placers from the sea level up to 1,800 m. — Far East: Kamch. (?), Okh., Uss. Gen. distr.: Manchzh. Described from Yablonoi Range in the environs of Okhotsk. Type in Leningrad.

3. *G. sericea* (Ser.) Fenzl in Endl. Gen. pl. I (1836-40) 972; Kryl., Fl. Zap. Sib. V, 1087. — *Arenaria purpurea* Willd. ex Cham. in Ges. Naturf. Fr. Berl. Mag. VII (1813) 211. — *Gypsophila purpurea* Fenzl, l. c., (1836-40), non Gilib. (1781). — *Arenaria sericea* Ser. in DC. Prodr. I (1824) 414. — *A. rubicunda* Spreng. Syst. Veg. II (1825) 399. — *Heterochroa petraea* Bge. in Ldb. Fl. Alt. II (1830) 132. — *Gypsophila petraea* Fenzl, l. c. (1836-40); in Ldb. Fl. Ross. I, 291, non Rchb. (1832). — *G. bungeana* Dietr. Syn. pl. II (1841) 1542. — Ic.: Ldb. Ic. pl. Fl. Ross. II, t. 135.

740 Perennial, glandular-pubescent throughout; stems numerous, procumbent, rooting at base, branched, 20-30 cm long; leaves linear-lanceolate, 6-15 mm long and 1.5-3.5 mm broad, the lower obtusish, the upper acute; flowers solitary at tips of branches and in the axils of upper leaves; pedicels glandular-pubescent, 1.4-2 cm long; calyx broadly campanulate, 4.5-5 mm long and 3.5-4 mm broad; teeth acuminate, scarious-margined, half length of calyx, three of them broader than the rest; petals white within, lilac outside, obovate, twice as long as calyx; ovary 14-16-ovuled; capsule broad-ovoid, 4-5 mm long; seeds reniform, 1 1/3 mm long, muricate, black. June-August.

Rocks and stony slopes. — W. Siberia: Alt.; E. Siberia: Ang.-Say. Gen. distr.: N. Mongolia. Described from Siberia. Type in Geneva.

4. *G. desertorum* (Bge.) Fenzl in Ldb. Fl. Ross. I (1842) 292; Kryl., Fl. Zap. Sib. V, 1087. — *Heterochroa desertorum* Bge. Supplem. Alt. (1836) 29.

Perennial, glandular-pubescent throughout; taproot stout, 0.5-1.5 cm thick; stems woody at base, 5-15 cm long, ascending; leaves linear-subulate, 4-15 mm long and 1 mm broad, acute, keeled beneath, revolute-margined, prostrate or falcately recurved; inflorescence corymbose-paniculate; pedicels 3-12 mm long, erect; calyx broadly campanulate, 4-5 mm long and 2-3 mm broad; teeth ovate-oblong, with white scarious margin, obtuse, half length of calyx; petals one and a half times to twice as long as calyx, white inside, purple-tinged outside, obovate-cuneate, scarcely emarginate; ovary 15- or 16-ovuled; capsule ovoid, 4 mm long; seeds reniform, ca. 1 1/3 mm long, muricate. June-July. (Plate XLVI, Figure 4).

Stony semideserts and rocks. — W. Siberia: Alt. (Chuya steppe). Gen. distr.: N. Mong., Tuva Republic. Described from Chuya steppe (Altai). Type in Leningrad.

5. *G. microphylla* (Schrenk) Fenzl in Ldb. Fl. Ross. I (1842) 291. — *Heterochroa microphylla* Schrenk, Enum. I. pl. soong. (1841) 92.

Perennial; stems numerous, procumbent, 8-10 cm long, slender, densely leafy, puberulent; leaves linear-elliptic, thickish, 4-6 mm long and 1-2 mm broad, 1-veined, short-petioled or sessile, obtusish, ciliolate, with short leafy shoots in the axils; inflorescence a terminal raceme; pedicels puberulent, equaling or longer than calyx; calyx broadly campanulate, 3-3.5 mm long, glabrate or puberulent; teeth lanceolate, obtuse, scarious-margined, half length of calyx, petals purple, obovate-cuneate, one and a half times as long as calyx, rounded or truncate or emarginate at apex;



PLATE XLVI. 1. *Gypsophila capitata* M. B., flower, bract; — 2. *G. glomerata* Pall., bract. — 3. *G. globosa* Stev., bract. — 4. *G. desertorum* Bge., flower. — 5. *G. microphylla* Schrenk., flower. — 6. *G. herniarioides* Boiss., flower. — 7. *G. imbricata* Rupr.

ovary 10–12-ovuled; seeds reniform, ca. 1 mm long, finely rugulose. July. (Plate XLVI, Figure 5).

Taluses in the alpine zone. — Centr. Asia: Dzu.-Tarb. (Dzhungarian Ala-Tau), T. Sh. (Talgar). Gen. distr.: Sinkiang Province. Described from Dzhungarian Ala-Tau (Kuktau mountains). Type in Leningrad.

6. *G. turkestanica* Schischk. in Trav. du Musée bot. de l'Acad. Sc. de l'URSS XXIV (1932) 38. — Ic.: Schischk., l. c., tab. 5.

Perennial; stems numerous, trailing, strongly branched, 4–12 cm long, slender, glabrous; leaves linear, 4–8 mm long and 1–2 mm broad, thickish, 1-veined, glabrous, narrowing toward base, obtusish; leaves of axillary fascicles smaller; flowers in the axils of upper leaves; pedicels filiform, 0.5–1 cm long; calyx broadly campanulate, 2.5–3 mm long, glabrous; teeth obtuse, scarious-margined, nearly half length of calyx; petals purple, one and a half to twice as long as calyx, obovate-cuneate, truncate; ovary 16–18-ovuled; capsule slightly longer than calyx; seeds smooth, ca. 1 mm in diameter. July.

Taluses in the alpine zone. — Centr. Asia: T. Sh. (Aleksandrovsik range between the Chachko and Trek Rivers). Endemic. Described from the location indicated. Type in Leningrad.

Series 2. *Pseudoverticillatae* Schischk. — Calyx tubular, 5–8 mm long, cut to one-fifth or one-fourth.

7. *G. herniarioides* Boiss. Fl. Or. Suppl. (1888) 84. — *G. pseudoverticillata* Kom., in Trav. Soc. Nat. Pétersb. XXVI (1896) 123.

Perennial; rhizome 4–7 mm thick, 10–20 mm at the top; stems numerous, slender, the lower underground part covered with whitish foliaceous scales, the aerial part profusely branched; branches short, densely leafy, glabrous in lower part, velutinous above; leaves spatulate, 4–8 mm long and 0.5–3 mm broad, tapering at base, clasping, obtuse at apex, scabrous, 1-veined, with short leafy shoots in the axils; inflorescence capitate, 10–20-flowered; pedicels 0.5–1.5 mm long; calyx tubular-campanulate, 5–8 mm long and 2–3 mm broad, velutinous; teeth obtusish, scarious-margined, one-fifth to one-fourth length of calyx; petals whitish, oblong-linear; ovary 12-ovuled. June–August. (Plate XLVI, Figure 6).

Taluses and waterside pebbles in the alpine zone, at altitudes between 1,800 and 3,600 m. — Centr. Asia: Pam.-Al. Gen. distr.: Afghanistan. Described from Afghanistan, Mount Sikaram. Type in London; cotype in Leningrad.

8. *G. antoninae* Schischk. in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, III (1936).

Perennial; rhizome long, 4–6 mm thick; stems numerous, slender, profusely branched at base; branches 10–15 cm long, trailing, glabrous in lower part, velutinous above, brittle; leaves linear 5–8 mm long and 0.5–1 mm broad, with sterile fascicles in the axils; inflorescence capitate at ends of branches, 1.5–2.5 cm in diameter, 10–20-flowered; bracts herbaceous, linear, leaflike, glandular-puberulent; pedicels 2–3 mm long; calyx tubulate-campanulate, ca. 6 mm long and 2.5 mm broad, glandular-pubescent, with white-scarious stripes; teeth lanceolate, obtusish, narrowly scarious-margined; one-quarter length of calyx; petals dark purple, oblong-linear, one and a half times as long as calyx; ovary 12-ovuled. June–July.

Gravelly slopes, at altitudes of about 1,500 m. — Centr. Asia: Mtn. Turkm. (Kopet-Dagh Range—Gaudan, Kyzyl-Khasar). Endemic. Described from Kopet-Dagh (Kyzyl-Khasar). Type in Leningrad.

Section 2. *PULVINARES* Boiss. Fl. Or. I (1867) 534. — Sect. *Excipae* Williams, Revisio Gen. Gypsophila in Journ. of Botany XXIX (1889) 332. — Plants densely pulvinate; stem leaves very small, imbricate; stamens exerted from corolla; seeds tuberculate.

9. *G. aretioides* Boiss. Diagn. Ser. I, 1 (1842) 9; Fl. Or. I (1867) 538; V. Savicz, K biologii *G. aretioides* Boiss. [Concerning the biology of *G. aretioides* Boiss.] in Mon. du Jard. bot. de Tiflis 27 (1913) 19–25; Grossg., Fl. Kavk. II, 419. — *G. raddeana* Rgl. in A. H. P. X (1889) 698. — Ic.: Rgl. Gartenfl. XLI, t. 1365; Savicz., l. c., p. 25; Lipskii, Bot. issl v Zakasp. obl., Plate 12; Doboyanskii, Trudy Peterburg. Obshch. Estestv. XXVII (1897), Plate 1 and 2. — Exs.: H. F. A. M. no. 124; Fedtsch. Fl. turk. exs. no. 66.

Perennial, glabrous throughout; branches strongly lignified, forming a compact pulvinate mat 75–200 cm in diameter, their tips densely leafy; leaves fleshy, imbricate, oblong-triangular, obtuse, 1–2 mm long; flowers solitary at tips of branches; pedicels 1–3 mm long, with a pair of small scarious bracteoles; calyx campanulate, 2–3 mm long; teeth obtuse, scarious-margined, half length of calyx; petals white, entire, one and a half times as long as calyx; capsule dehiscent to base into 4 valves; seeds minutely tuberculate. June–July.

Rocks, at altitudes between 900 and 2,000 m. — Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm. Gen. distr.: N. Iran. Described from N. Iran. (Mount Demavend). Type in Geneva.

745 Note. An unusual plant, forming cushions 75–200 cm in diameter, that sometimes weigh up to 150 kg. The cushions are very hard and look at a distance like lichen-covered stones. They consist of a complex system of interwoven branches, gradually attenuate toward the periphery and terminating in minature stemlets covered with very small imbricated leaves. According to V. Savich (l. c.), the plants are capable of absorbing atmospheric moisture upon their surface independantly of root action. The plant reproduces readily from slips which easily form adventitious roots. On the other hand, a completely rootless cushion is sometimes capable of producing new leaves and flowers, provided a sufficient amount of moisture is available.

Economic importance. When woody vegetation is extremely scarce, the cushions of *G. aretioides* are sometimes used in Turkmenia as fuel.

10. *G. imbricata* Rupr. Fl. Cauc. I (1869) 176; Will. in Journ. of Bot. XXVII (1889) 321; Grossg., Fl. Kavk. II, 419. — *G. aretioides* β *caucasica* Boiss. Fl. Or. Supplem. (1888) 84. — *G. aretioides* subsp. *imbricata* Bornm. in Beih. Bot. Zentralbl. XXXII (1914) 362. — *G. aretioides* var. *imbricata* Somm. et Lev. in A. H. P. XVI (1900) 66.

Perennial; taproot to 18 cm long and 4–5 mm thick, woody, much branched; stems numerous, woody, forming a cushion, covered with persistent imbricate leaves; leaves linear ca. 2 mm long and 0.5–0.6 mm broad, glabrous, obtuse, ribbed beneath, connate in pairs into sheaths; annotinous stems 2–3 cm long,

slender, erect, with 3 distant leaf pairs, terminating in 3 or 4 or more rarely solitary flowers; bracts membranous; pedicels glabrous, ca. 2 mm long; calyx ovaloid, 3.5 mm long; teeth ovate, acute, scarious-margined, half length of calyx; petals white, twice as long as calyx, obovate-spatulate, notched; capsule ovoid-globular, scarcely exceeding calyx; seeds subglobose, 2.1 mm in diameter, finely muricate. July–August. (Plate XLVI, Figure 7).

Calcareous rocks, at altitudes of about 800 m. — Caucasus: northern slopes of the main range (along the Ardon River). Endemic. Described from N. Osetiya (Ardon River near Alager). Type in Leningrad.

Section 3. *CAPITATAE* Boiss. Fl. Or. I (1867) 535. — Flowers in spherical heads, these with triangular acuminate scarious bracts at base; stamens exserted from corolla; ovary 6–8-ovuled.

11. *G. capitata* M. B. Fl. taur.-cauc. I (1808) 321; Boiss. Fl. Or. I, 547; Rupr. Fl. Cauc. I, 180; Shmal'g., Fl. I, 131; Grossg., Fl. Kavk. II, 419. — *G. glomerata* Adams in Web. et Mohr, Beitr. (1805) 54, non Pall. (1795). — *G. glomerata* β *capitata* Ser. in DC. Prodr. I (1824) 354.

16 Perennial, woody at base; stems numerous, ascending, 20–40 cm long, glabrous, slightly branched; leaves thickish, linear, short-acuminate, 1–2.5 cm long and ca. 1 mm broad, glaucous, with smooth margins; flowers heads spherical, 8–11 cm in diameter; pedicels long; floral leaves surrounding the head broad, ovate, acute, scarious, the outermost connate at base in pairs; bracts ovate, equaling the calyx, scarious, finely pruinose on the outside; pedicels very short; calyx tubular-campanulate, 3.5 mm long; teeth ovate, acute, entire, two-thirds length of calyx; petals white, oblong-linear, one and a half times as long as calyx; filaments not exserted; ovary 8–12-ovuled; capsule ovoid-globular, 2.5 mm in diameter, 1-seeded; seeds compressed-globular, bluntly tuberculate, 1.5 mm in diameter. June–August. (Plate XLVI, Figure 1).

Stony slopes, limestone, and shingle. — Caucasus: Dag., E. Transc. Endemic. Described from Kazakh Pass–Kurt-Bulak. Type in Leningrad.

12. *G. glomerata* Pall. Cat. Taur. (1795) 50, nom. nud.; M. B. Fl. taur.-cauc. I (1808) 321 (descr.); Fenzl in Ldb. Fl. Ross. I, 299; Boiss. Fl. Or. I, 547; Shmal'g.; Fl. I, 130. — *Petrorhagia glomerata* Link, Handb. II (1831) 235. — Ic.: Lodd. Bot. Cab. XIV, t. 1384 (1828). — Exs.: HFR no. 2987; Herb. normale ed. Dörfler, no. 501; Boenitz. Herb. eur. no. 8175.

Perennial; stem erect, 20–60 cm long, branched and glandular-pubescent in upper part; leaves thickish linear, 3–10 cm long and 1.3 mm broad, the margin glandular-denticulate under strong magnification; flowers subsessile, in compact heads, membranous-bracted; calyx 3.5 mm long, broadly campanulate; teeth entire, half length of calyx; petals white, oblong-linear, one and a half times as long as calyx; ovary 6–8-ovuled. June–July. (Plate XLVI, Figure 2).

Rocks, dry and stony, often-calcareous or sandy slopes. — European part: Crim.; Caucasus: W. Transc. (Novorossiisk). Gen. distr.: Bulgaria, Rumania, Hungary. Described from Crimea. Type in Leningrad.

13. *G. globulosa* Stev. ex Bess. in Flora XV, 2 Beibl. (1832) 34; Boiss. Fl. Or. I, 547; Rupr. Fl. Cauc. I, 181; Grossg., Fl. Kavk. II, 420. — *G. glomerata* Adams in Web. et Mohr, Beitr. I (1805) 54, non Pall. — *G. glomerata* var. *globulosa* Schmalh., Fl. I (1895) 131. — *G. capitata* Fenzl in Ldb. Fl. Ross. I, 300, non M. B. — Exs.: HFR no. 1311.

747 Perennial; stem erect, 40–75 cm long, viscid-glandular in the branched upper part, glabrous elsewhere; leaves linear, 3–10 cm long and 1–3 mm broad, thickish, scabrous; flowers subsessile, in compact spherical inflorescences 10–12 mm in diameter; bracts obovate, erose-dentate at the rounded apex; calyx broad-campanulate, 3.5 mm long; teeth obtuse, half length of calyx; petals white, one and a half times as long as calyx, with oblong limb; ovary 8-ovuled. June–August. (Plate XLVI, Figure 3).

Stony, mostly calcareous slopes and rocks. — European part: Bl.; Caucasus: Cisc. Endemic. Described from Pyatigorsk and Konstantinogorsk.

★14. *G. cappadocica* Boiss. et Bal. in Boiss. Diagn. ser. II, 6 (1859) 26; Grossg., Fl. Kavk. II, 418. — *G. sphaerocephala* β *cappadocica* Boiss. Fl. Or. I (1867) 548. — *G. armeniaca* Hausskn. in herb.

Perennial, woody at base; stems numerous, erect, 40–60 cm long, simple or slightly branched, glabrous, glaucescent, thickened at nodes; leaves thickish, linear, 3–6 cm long and 1–2 mm broad, prickly-trigonous, flat above, sharply keeled beneath, with naked or scabrous margin, equaling or exceeding internodes; flower head spherical, compact, 1–1.5 cm in diameter, petiolate or sessile; bracts triangular, glandular-pubescent, scalelike, broadly scarious-margined; bracteoles lanceolate, acute, scarious, glandular on the margin and on the midrib; pedicels very short; calyx tubular-campanulate, 4 mm long, glandular-pubescent; teeth ovate-triangular, obtuse, scarious-margined, one-fourth length of calyx; petals pink, elliptic-lanceolate, one and a half times as long as calyx; filaments exerted; ovary 8-ovuled. June–July.

Stony and dry slopes; borders of plowfields. Up till now unknown in the USSR, but occurring in adjacent parts of Turkey (Promezhutochnaya Stantsiya of former Kars Region and in former Olting district). Gen. distr.: Arm. — Kurd., As. Min. Described from Cappadocia (Mount Aslan-Dagh). Type in Geneva.

Section 4. *EUGYPSOPHILA* Boiss. Fl. Or. I (1867) 534. — Flowers commonly numerous, with scarious bracts; petals white, pink or purple, the two surfaces mostly concolor. Perennials; leaves not spinescent; roots not tuberous.

Series 1. *Fastigiatae* Schischk. — Flowers in compact corymbose inflorescences; calyx 1.5–2.5 mm long; ovary 12–24-ovuled.

15. *G. fastigiata* L. Sp. pl. (1753) 407; Fenzl in Ldb. Fl. Ross. I, 299, lus 1; Shmal'g., Fl. I, 131, excl. subsp. *collina*. — *G. pulposa* Gilib. Fl. Lithuan. II (1781) 153. — *Saponaria fastigiata* Lam. Fl. Franc. II (1778) 541. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 241. — Exs.: HFR no. 9.

Perennial; stems 10–50(60) cm long, ascending at base, then erect, glabrous in lower part, branched and glandular-pubescent in inflorescence;

8 leaves lance-linear to linear, 2–8 cm long and 1–2 mm broad, flat, 1-veined; flowers crowded at tips of stem and branches in compact corymbose inflorescences; pedicels glandular-pubescent, 1–2 mm long; bracts scarious; calyx campanulate, 1.5–2.5 mm long; teeth obtuse, half length of calyx; petals whitish or pink, one and a half times as long as calyx; ovary 24-ovuled. June–July. (Plate XLVII, Figure 2).

Pine woods on sandy soils. — European part: Kar.-Lap., Lad.-Ilm., U. Dnp. Gen. distr.: Centr. Eur., Scand. Described from Gothland, Borussia, Switzerland. Type in London.

16. *G. ucranica* Kleop. sp. nova in Addenda V, p. 679.

Perennial; rhizome rather long, creeping; stems several, erect or ascending, glabrous, 25–65 cm long, branched and glandular in inflorescence; leaves lanceolate to lance-linear, acute, 4–8 cm long and 4–7 mm broad, glabrous, glaucescent, the lower petiolate; flowers at tips of stems and branches in dense corymbs forming a corymbose-paniculate inflorescence; bracts broad-ovate, mucronulate, scarious, 3–4 mm long and 2–2.5 mm broad, the brownish midrib often glandular-pubescent; pedicels 2–4 mm long, glabrous; calyx broadly campanulate, 2.5–3 mm long, glabrous; teeth obtuse, scarious-margined, nearly half length of calyx; petals white (in dry specimens), one and a half times as long as calyx, obsubulate, rounded at apex; ovary 14- or 15-ovuled. August.

Pine woods. — European part: M. Dnp. Endemic. Described from the vicinity of Kiev. Type in Leningrad.

17. *G. dichotoma* Bess. Prim. Fl. Galic. (1809) 372. — *G. collina* Stev. ex Ser. in DC. Prodr. I (1824) 352. — *G. struthium* Fenzl in Ldb. Fl. Foss. I, 295, non L. — *G. fastigiata* subsp. β *collina* Schmalh., Fl. I (1895) 131. — Exs.: Lang et Szovits, Herb. ruthen. Cent. I, 48.

Perennial; stem 30–80 cm long, simple or branched at summit, glabrous; leaves linear, thickish, 2–3(–5) cm long and 1–2.5 mm broad, 3-veined, acute, rough-margined, with fairly long sterile branchlets in the axils; flowers at the summit of the stem in a compact corymbiform panicle; bracts scarious, lanceolate, ciliate-margined; pedicels 1–3 mm long; calyx 2.5–3 mm long, broadly campanulate; teeth rounded, ciliate, obtuse, one-third length of calyx; petals pink, oblong, one and a half times as long as calyx; ovary 10–12-ovuled; capsule slightly exceeding calyx; seeds reniform, ca. 1 mm long, muricate. June–August.

Hill slopes. — European part: M. Dnp. (Baltic region), Bl., Crim. Gen. distr.: Galicia, S. Poland. Described from Galicia (Jaslo). Type in Berlin.

Series 2. *Parviflorae* Fenzl in Ldb. Fl. Ross. I (1842) 297. — Mostly tall plants; stems herbaceous, profusely branched; calyx 1.5–3.5 mm long, glabrous or (very rarely) with a crystalline bloom; pedicels 2–8 mm long; ovary 4–8-ovuled, rarely 12–18-ovuled.

49 18. *G. paniculata* L. Sp. pl. (1752) 407; Fenzl in Ldb. Fl. Ross. I, 297, ex parte; Shmal'g., Fl. I, 132; Kryl., Fl. Zap. Sib. V, 1091. — *G. paniculata* var. *subglandulosa* Lipsky in Zap. Kievsk. Obshch. Estestvoisp. XI, 2 (1891) 41. — Ic.: Rchb. Ic. Fl. Germ. VI, tab. 242. — Exs.: HFR no. 1039.

Vernacular: Perekati-pole [tumble-weed].

Perennial; taproot stout, commonly vertical; plant glabrous throughout, more rarely glandular-pubescent in lower part (var. *subglandulosa* Lipsky Lipsky); stems solitary, more rarely several, erect or at base ascending, 40–100 cm long, in lower part 3–5 mm thick, profusely branched nearly from base, often forming a spherical bush; lower leaves soon wilting; median stem leaves lanceolate to linear-lanceolate, 2–5 cm long and 2.5–8 mm broad, long-acuminate, with prominent midrib and faint lateral veins, bearing leafy sterile shoots in the axils; inflorescence a broad open many-flowered panicle; pedicels filiform, 2–6 mm long; calyx broadly campanulate, ca. 1.5 mm long; teeth ovate, obtuse, scarious-margined, half length of calyx; petals white, twice as long as calyx; ovary 4-ovuled; capsule broadly obovoid to subglobose, to 2 mm in diameter; seeds ca. 1 mm long, tuberculate. June–July. (Plate XLVII, Figure 3).

Meadow steppes, margins of pine woods, sands, and calcareous slopes. — European part: U. Dnp., U. V., V.-Kama, M. Dnp., V.-Don, Transv., Bl., L. Don; Caucasus: Cisc., Dag.; W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Balkh., Ar.-Casp. Gen. distr.: Centr. Eur., Atl. Eur. (introduced), N. Mong., W. Chi., N. Am. (introduced). Described from Siberia. Type in London.

Economic importance. The roots contain saponin. The plant is also used for wreath arrangements.

Note. The profuse branching sometimes results in the formation of an almost spherical bush which, upon breaking off, may be carried by wind over considerable distances and is therefore referred to as "tumble-weed." It should be noted, however, that this epithet is also applied to certain other plants.

19. *G. bicolor* Freyn. et Sint. in Bull. Herb. Boiss. II sér. III (1903) 864, sub *G. paniculata* subsp. *G. bicolor* Freyn; Grossh. in Mon. du Jard. bot. de Tiflis 46–47 (1919) 36; Grossg., Fl. Kavk. II, 423. — *G. paniculata* α *effusa* Fenzl in Ldb. Fl. Ross. (1842) 297. — *G. paniculata* var. *latifolia* Hohenack. Enum. Talysch (1838) 159. — *G. paniculata* Boiss. Fl. Or. I, 542, pro maxima parte. — *G. paniculata* β *hirta* Grun. in Bull. Soc. Nat. Mosc. XL, 4 (1867) 406. — Exs.: Pl. Or. exs. no. 303.

750 Perennial; stem glabrous, glaucous, 50–100 cm long, profusely branched from base, the lower internodes close together; leaves glaucescent, glabrous or the lower sometimes glandular-hairy (var. *hirta* Grun.), lanceolate to linear-lanceolate, acuminate, 4–6 cm long and 5–17 mm broad, with prominent midrib and 2–4 faint lateral veins; flowers polygamodioecious, in a lax many-flowered inflorescence; bracts very small, linear-lanceolate, with white crystalline bloom beneath; pedicels filiform, glabrous, 5–10 mm long; calyx campanulate, 1.5–2.5 mm long, with 5 dark nerves and white crystalline bloom; teeth broad-ovate, round-tipped, narrowly membranous-margined, half length of calyx; petals white, one and a half times as long as calyx, entire or emarginate; ovary rounded-ovoid, 8-ovuled; style long, glabrous; capsule globular-ovoid. June–July.

Dry steppes, sandy slopes, open woods, fallows, and occasionally among crops. — Caucasus: E. and S. Transc., Tal.; Centr. Asia: Kara K., Kyz. K., Mtn. Turkm. Gen. distr.: Arm.-Kurd., Iran. Described from Turkmenia (Nevtonovka, Sulyuklyu, Sunsodag). Type in Vienna.

Economic importance. As in the preceding species, the root contains saponin and is used as a soap substitute.

20. *G. altissima* L. Sp. pl. (1753) 407; Fenzl in Ldb. Ross. I, 289; Turcz. Fl. baic.-dah. I, 299; Williams in Journ. of Bot. XXVII, 325; Shmal'g., Fl. I, 131; Kamch., Fl. Zap. Sib. V, 1092. — *G. altissima* β *elongata* Bge. in Ldb. Fl. Alt. II (1830) 127. — *Arrostia altissima* Rafin. Fl. Tellur. I (1836) 54. — Ic.: Rechb. Ic. Fl. Germ. VI, tab. 241. — Exs.: HFR no. 1310.

Perennial; taproot stout, 0.5–1.5 cm thick; stems solitary or 2 or 3, erect, branched in inflorescence, 30–80 cm long, glabrous, usually glandular-pubescent in the forks, rarely glabrous (f. *glabra* Blocki); leaves glaucescent, obtusish or short-acuminate, narrowing toward base, obscurely 3-veined; flowers in a contracted corymbose-paniculate inflorescence; pedicels 2–5 mm long; bracts scarious; calyx campanulate, 2–2.5 mm long and 1.5 mm broad, glabrous; teeth ovate, obtuse, scarious-margined, nearly half length of calyx; petals white, oblong-obovate, twice as long as calyx; ovary 8–12-ovuled; capsule globose, 2–2.5 mm in diameter; seeds muricate, 1–1.25 mm long. June – August.

Meadow steppes, chernozem meadows, turfy and sometimes stony slopes, especially calcareous, more rarely thin pine woods. — European part: M. Dnp., Bl., V.-Don, V.-Kama, L. Don, L. V., Transv., S. Ural; Caucasus: Cisc., Dag.; W. Siberia: Ob (S. part), U. Tob., Irt., Alt.; E. Siberia: Ang.-Say, Dau. **Gen. distr.:** Centr. Eur. (Galicia, Bukovina). Described from Siberia. Type in London.

21. *G. tianshanica* M. Pop. et Schischk. in Index Sem. Horti bot. Almatensi Ac. Sc. URSS II (1935) 12, descr. incompl.; Addenda V, p. 679.

Perennial; taproot rather stout, 4–6 mm thick, obliquely ascending, multicipital; stems 4–10, very slightly ascending at base, then erect, 45–65 cm long, glandular-pubescent and branched in inflorescence, the branches ascending; short leafy shoots present in addition to flowering stems; leaves glaucescent, lanceolate to linear-lanceolate, 4–6.5 cm long and 2–5 mm broad, commonly 1-veined, obtusish, narrowing toward base, the lower cauline and those of the sterile shoots long-petioled; pedicels very slightly glandular-pubescent, 2–4 mm long; flowers in rather dense corymbiform cymes forming a paniculate inflorescence; calyx glabrous, campanulate, to 2 mm long; teeth ovate, rounded-obtuse, with a broad white-scarious margin, half length of calyx; petals twice as long as calyx, cuneate, rounded or truncate or scarcely emarginate at apex; style one and a half times to twice the length of ovary; ovary 12–18-ovuled; capsule broad-ovoid, 3–3.5 mm long; seeds rounded-reniform, finely striate, 1.2–1.4 mm long. July – August.

Stony steppe slopes and pebbles. — Centr. Asia: T. Sh. Endemic. Described from Zailiiski Ala-Tau (Chilik River). Type in Alma Ata.

22. *G. litwinowii* Kos.-Pol. in Sched. ad Herb. Fl. Ross. VIII (1922) 61. — Exs.: HFR no. 2517.

Perennial; taproot elongated, 6–10 mm thick; stems numerous, erect or else ascending with numerous densely leafy sterile shoots at base, 30–50 cm long, branched glabrous, in inflorescence glandular-pubescent; leaves

linear to linear-lanceolate, 2–3.5 cm long and 2–4 mm broad, acute or acuminate, narrowing toward base, 1-veined or rarely obscurely 3-veined; inflorescence loosely paniculate; bracts ovate-lanceolate, scarious, acute, or obtusish; flowers pedicellate; calyx campanulate, 1.5–2 mm long, with obtuse scarious-margined teeth; petals white, linear, about twice as long as calyx; ovary 8-ovuled; capsule subglobose, 2–3 mm long; seeds ca. 1 mm long, muricate. July.

Steppes and chalky slopes. — European part: V.-Don. Endemic. Described from Zemlyansk district, Voronezh Region. Type in Leningrad.

Note. According to oral communication by D. I. Litvinov, this plant was described from luxuriant specimens which had grown under special conditions and is not a distinct species but merely a vigorous form, apparently of *G. altissima* L. We had only three specimens of this plant, collected at the locus classicus and displaying features of abnormal development. We draw the attention of future investigators to this species which may have to be eliminated from the USSR Flora.

752 23. *G. krascheninnikovii* Schischk. in Trav. du Musée bot. de l'Acad. Sc. de l'URSS, XXIV (1932) 36. — Ic.: Schischk., l. c., fig. 4.

Perennial; stems erect, branched from the middle, glabrous, 60–100 cm long; leaves oblong-spatulate or obovate-lanceolate, 3.5–6 cm long and 0.8–1.6 cm broad, glaucous, obtuse or acutish, with prominent midrib and faint lateral veins; inflorescence branches glandular-hairy; pedicels filiform, 5–8 mm long, glabrous or in lower part glandular; calyx campanulate, 2 mm long; teeth obtuse, scarious-margined, more than half the length of calyx; petals white, obovate-cuneate, one and a half times as long as calyx; seeds reniform, rounded, to 1 mm in diameter, bluntly tuberculate. June–July.

Sandy and solonetz steppes, sandy banks of rivulets, and stony slopes. — Centr. Asia: Ar.-Casp. Endemic. Described from Kunsh (Temir River). Type in Leningrad.

24. *G. cephalotes* (Schrenk) Will. Rev. Gen. Gypsophila in Journ. of Bot. XXVII (1889) 323; Kom., Materialy k Flore Turkestan'skogo nagor'ya (1896) 122 excl. syn. *G. capituliflora* Rupr.; Raikova in Opred. rast. okr. Tashkenta II (1924) 115; Kryl., Fl. Zap. Sib. V, 1903. — *G. fastigiata* β *cephalotes* Schrenk, Enum. I pl. nov. (1841) 92; Fenzl in Ldb. Fl. Ross. I, 299. — *G. planifolia* H. Winkl. in Vidensk. Medd. Kjobenh. (1901) 48.

Perennial; taproot 3–15 mm thick; stems several, more rarely solitary, erect, glandular-pubescent in upper part or only in inflorescence, glabrous elsewhere, 10–50 cm long; leaves glabrous, oblong-linear to linear, more rarely oblong-obovate, 3–6 cm long and 3–8 mm broad, obtusish, 3–5-veined, the radical short-petioled, the cauline sessile; flowers in a rather compact terminal head; bracts scarious; pedicels 0.5–2.5 mm long; calyx campanulate, 2.5–3.5 mm long and 1.5–2 mm broad, glabrous; teeth ovate, obtuse, scarious-margined, half the length of calyx; petal white, one and a half to twice as long as calyx, oblong-obovate, obtuse, cuneately attenuate toward base; ovary 16–18-ovuled; capsule subspherical, 3–4 mm in diameter; seeds to 1.5 mm long, muricate. June–July. (Plate XLVII, Figure 1).

Alpine and subalpine meadows and slopes. — W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. Endemic. Described from Dzhungarian Ala-Tau (tributary of Tentek River). Type in Leningrad.

25. *G. simulatrix* Bornm. et Woron. in Mon. du Jard. bot. de Tifl. livr. 29 (1913) 28; Grossg., Fl. Kavk. II, 423. — Exs.: Herb. Fl. Cauc. no. 269.

53 Perennial; stem 50–60 cm long, branched from the middle or below, glaucescent, glabrous; leaves crowded in lower part of the stem, linear-oblong or spatulate-lanceolate, 2–4.5 cm long and 3–12 mm broad, glaucous, 1–3-veined, acutish, tapering toward base, the upper linear; flowers at tips of branches in few-flowered corymbs forming a loose panicle; inflorescence branches glutinous above the forks; bracts small, linear, scarious; pedicels setaceous, slightly longer than calyx; calyx tubular-campanulate, ca. 2.5 mm long, covered with white crystalline bloom; teeth obtuse, ovate, scarious-margined, minutely mucronulate; half the length of calyx; petals white, oblong, one-third as long as calyx; ovary 8-ovuled; capsule subglobose, 2.5 mm in diameter; seeds reniform, to 1 mm long, tuberculate. July.

Stony and calcareous slopes. — Occurring in former Oltn and Artvin districts at Turkish border. Endemic. Described from Lomashen (Artvin district). Type in Tbilisi.

26. *G. albida* Schischk. in Candollea III (1928) 474; Grossg., Fl. Kavk. II, 424.

Perennial; stem 20–30 cm long, branched, glandular in inflorescence, glabrous elsewhere; leaves lanceolate, 2–3 cm long and ca. 1 cm broad, acute, with midrib and 2 obscure lateral veins, glabrous, scarcely roughened on the margin; flowers at tips of branches in few-flowered corymbiform inflorescences; bracts scarious, broadly triangular, glandular on the margin; pedicels glandular-pubescent, 1–4 mm long; calyx campanulate, 3 mm long, densely white-punctate and hence whitish throughout; teeth acute, at least half the length of calyx; petals white, one and a half times as long as calyx, sometimes slightly emarginate, the claw dilated; ovary 15-ovuled. August.

Dry slopes. — Caucasus: S. Transc. (Kulim in the Nakhichevan ASSR). Endemic. Described from Kulim. Type in Leningrad.

Series 3. *Capillares* Schischk. — Stems herbaceous, branched from base; flowers numerous; pedicels slender, filiform, 1–2 cm long; calyx 2–2.5 mm long, glabrous or glandular-pubescent; ovary containing 8–12 ovules.

27. *G. diffusa* Fisch. et Mey. in Bull. Soc. Nat. Mosc. (1839) 146, nom. nud.; Rupr. Fl. Cauc. (1869) 180 in observ. cum descript. brev.; Trautv. in A. H. P. II (1873) 507; Schischk. in Trav. du Musée bot. de l'Ac. Sc. URSS XXIV (1932) 35, descr. compl. — *G. elegans* auct. Fl. As. Med., non M. B.

Perennial; taproot stout, yellowish; stems several, ascending or erect, glaucous, often branched from base, 10–30 cm long, glandular-pubescent in inflorescence, glabrous elsewhere; lower leaves spatulate, 1.5–2 cm long and 3–5 mm broad, obtusish, 1-veined; median and upper leaves linear-lanceolate, acute; flowers numerous, in a loose inflorescence; pedicels filiform, glandular-pubescent, 1–2 cm long; bracts ovate-lanceolate, scarious-margined; calyx broadly campanulate, 2–2.5 mm long; teeth

754 obtuse, scarious-margined, glabrous or sometimes with scattered glandular hairs; one-third the length of calyx; petals white, one and a half times as long as calyx; ovary 8-ovuled; seeds reniform-triangular, to 1 mm long, finely tuberculate. May—June. (Plate XLVII, Figure 5).

Stony, often calcareous slopes. — Caucasus: E. Transc. (Sadarak); Centr. Asia: Ar.-Casp., Kara K. Endemic. Described from the E. coast of the Caspian Sea. Type in Leningrad.

28. *G. szowitsii* Fisch. et Mey. ex Fenzl in Ldb. Fl. Ross. I (1842) 289 excl. var. *glandulosa*; Boiss. Fl. Or. I, 550; Grossg., Fl. Kavk. II, 422. — *G. szovitsii* α *glabrata* Fenzl in Ldb., l. c. (1842) 289; Walpers, Repert. II, Supp. I (1843) 774.

Perennial; stems numerous, branched from base, 25–40 cm long, glandular-pubescent in lower part as are the leaves; leaves thickish, subulate, 1–3.5 cm long and 0.5–2 mm broad, acute, the uppermost short capillary; flowers in an open panicle; pedicels setaceous; glabrous, 1–2 cm long; bracts linear-subulate, herbaceous; calyx campanulate, 2 mm long; teeth oblong, obtuse, with white scarious margin; half the length of calyx; petals pink, one and a half to twice as long as calyx, oblong-spatulate, notched; ovary 10–12-ovuled; capsule very slightly shorter than calyx; seeds very small, tuberculate. May–August.

Clayey southern slopes. — Caucasus: E. and S. Transc. Endemic. Described from E. Transcaucasia. Type in Leningrad.

Series 4. *Virgatae* Schischk. — Stems numerous, woody at base, virgate; calyx 2–3 mm long, glabrous; ovary containing 4–10 ovules.

29. *G. virgata* Boiss. Diagn. pl. or. nov. ser. I, 1 (1842) 13; Fl. Or. I, 545; Grossg., Fl. Kavk. II, 421. — Exs.: Pl. or. exsicc. no. 204.

Perennial; stem woody at base, 50–60 cm long, knotted, glabrous, glaucescent, branched from the middle or below, the erect branches 5–17 mm long; leaves narrowly linear, 2 cm long and 1–2 mm broad, glaucescent, acute; inflorescence a few-flowered panicle; bracts very small, membranous, triangular, acute; pedicels filiform, somewhat thickened below the inflorescence, twice to five times as long as calyx; calyx campanulate, ca. 2 mm long, glabrous; teeth obtusish, scarious-margined, half the length of calyx; petals pink (?), scarcely longer than calyx, sometimes notched; ovary 10-ovuled. June. (Plate XLVII, Figure 4).

Calcareous slopes. — Caucasus: S. Transc. (between Dzhulfa and Darosham). Gen. distr.: W. Iran. Described from Isfahan. Type in Geneva.

757

30. *G. aulicatensis* B. Fedtsch. in Knorring et Minkwitz, Rastitel'nost' Aulieatinskogo y. Syr-Dar'inskoi obl. (1912) 186; M. popov in Bull. Univ. As. centr. XV, 289–292. — Ic.: Knorring et Minkwitz, l. c., tab. 30.

Perennial, woody at base; herbaceous stems numerous (about 100 or more), 40–50 cm long, erect or at base ascending, glaucescent, glabrous; leaves soon falling, linear-lanceolate, ca. 3 cm long and 2–4 mm broad, acute, thickish, 1-veined, with brownish margins; inflorescence a loose open panicle; bracts small, scarious; pedicels capillary, 5–10 mm long; calyx campanulate, 3 mm long, glabrous; teeth acutish, half the length of calyx; petals white (?), three times as long as calyx; ovary 4-ovuled;



PLATE XLVII. 1. *Gypsophila cephalotes* (Schrenk) Will.: flower, leaf.— 2. *G. fastigiata* L.: flower.— 3. *G. paniculata* L.: flower.— 4. *G. virgata* Boiss.: flower.— 5. *G. diffusa* Fisch. et Mey.: flower.

capsule ovoid, scarcely exceeding calyx; seeds ca. 1 mm long, naked. August—October.

Slopes of hills, especially gypseous. — Centr. Asia: Syr D. (Koktal River, sands of Muyun-Kum). Endemic. Described from Aulie Pass (Koktal River). Type in Leningrad.

Series 5. **Eriocalycinae** Schischk. — Inflorescence a contracted corymbiform panicle; pedicels and calyx densely covered with patulous hairs; ovary containing 4–6 ovules.

*31. **G. eriocalyx** Boiss. Diagn. ser. I, 1 (1842) 13; Fl. Or. I, 546; Grossg., Fl. Kav. II, 421.

Perennial; taproot stout, multicapital, giving rise to short woody stems, these bearing branches and short densely leafy sterile shoots; branches erect, slightly branched, glabrous in lower part, scabrous-pubescent above, 20–40 cm long; leaves thickish, glaucous, linear, acute, 1–3 cm long and 0.5–1 mm broad, glabrous; inflorescence corymbose-paniculate; pedicels pubescent, 1–3 mm long; bracts very small, scarious; calyx campanulate, ca. 2 mm long, densely covered with long papilliform hairs; teeth obtuse, scarious-margined, half length of calyx; petals white, twice to two and a half times as long as calyx; ovary 4–6-ovuled. June–July.

Dry clayey slopes and bluffs. — Not found up till now in the USSR; occurring in adjacent parts of Turkey in former Olting district (Oltichai River near Salyan and in the Tatrut-Chai Pass). **Gen. distr.:** Cappadocia, Taurus, and Turkish Armenia. Described from Asia Minor (Cappadocia). Type in Geneva.

Series 6. **Acutifoliae** Schischk. — Plants more or less glaucous, heavily glandular-pubescent in the forks of the inflorescence; calyx 3–4 mm long, glabrous, with acute or acutish teeth.

758 32. **G. acutifolia** Fisch. Hort. Gorenk. (1812) 59, num. nud.; Spreng. Novi prov. Hort. acad. Halens. et Berol. (1818) 21, descript.; M. B. Fl. taur.-cauc. III (1819) 296; Boiss. Fl. Or. I, 540 pp.; Rupr. Fl. Cauc. (1869) 179, 295; Shmal'g., Fl. I, 132. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 242, fig. 5004. — Exs.: HFR no. 9.

Perennial; taproots stout; stem erect or at base ascending, 20–170 cm long, branched, glabrous in lower part, in upper part including inflorescence glandular-hairy; leaves linear-lanceolate to lanceolate, 2–8 cm long and 2–10 (15) mm broad, acute, tapering toward base, 3–5-veined, with short sterile branchlets in the axils; inflorescence corymbose-paniculate; bracts scarious; pedicels erect, glandular, 1–3 mm long; calyx campanulate, 3.5 mm long, glabrous or on the nerves glandular; teeth oblong, acute, scarious-margined, half the length of calyx; petals white, about twice as long as calyx, notched; ovary 16-ovuled; capsule ovoid; seeds black, ca. 1.5 mm long, muricate. June–July.

Stony slopes. — European part: Bl. (Odessa, introduced?); Crim. (Feodosiya, introduced?); Caucasus: Cisc., Dag. Endemic. Adventive in various parts of W. Europe. Described from Pyatigorsk. Type in Berlin (?).

Economic importance. The plant has been introduced into cultivation in some places in W. Europe on account of the saponin content of the roots.

Note. The plant is usually reported for Transcaucasia but only *G. stevenii* Fisch. apparently occurs to the south of Greater Caucasus.

33. *G. stevenii* Fisch. ex Bess. Cat. Hort. Cremen. (1816) 64, nom. nud.; Descriptio apud. Schrank, Plantae rariores Horti Acad. monac. (1819) 32; DC. Prodr. I (1824) 353; Schischk. in Grossh., Sosn. et Schischk. Fl. tiflisiensis, 206. — Ic.: Schrank op. cit., tab. 32; Fl. tiflisiensis, 206. — Exs.: Pl. orient. exs. no. 256.

Perennial; taproot 7–15 mm thick; stems ascending at base, 10–60 cm long, branched, glabrous; inflorescence branches glabrous or glandular-pubescent; leaves linear 2–4 cm long and 1–3 (4) mm broad, glaucous, glabrous, acute, sometimes slightly flaccate; inflorescence an open few-flowered panicle; flowers in few-flowered dichasia at tips of stems and branches; pedicels glabrous or glandular-pubescent, 2–10 mm long; bracts scarious, ovate, acute, ca. 2 mm long; calyx campanulate, 3–3.5 mm long, covered with white crystalline bloom, with broad membranous bands; teeth ovate, acute, broadly scarious-margined, half the length of calyx; petals white, one and a half times as long as calyx, broadly linear, round-tipped; seeds reniform, minutely tuberculate, ca. 0.8 mm long. June–July.

Stony slopes and desert steppes. — Caucasus: E. Transc. Endemic. Described from the vicinity of Tbilisi (Siberia was erroneously indicated by Schrenk). Type in Berlin (?); cotype in Leningrad.

34. *G. meyeri* Rupr. Fl. Cauc. (1869) 178; Boiss. Fl. Or. Suppl. (1888) 85; Grossg., Fl. Kavk. II, 420. — *G. stevenii* C. A. M. Verzeichn. Pfl. cauc. (1831) 210, non Fisch.

Perennial; taproot stout, branched, giving rise to short leafy sterile shoots and flowering stems; stems branched, glabrous in lower part, glandular-pubescent in inflorescence; radical leaves linear to linear subulate, 5–15 cm long and 1–2 mm broad, 1-veined, acute; cauline leaves similar but only 2–5 cm long; bracts and upper leaves scarious-margined; inflorescence a panicle with glandular-pubescent branches; pedicels shorter than to twice as long as calyx; calyx campanulate, 3–3.5 mm long, glabrous or white-punctate, with violet-tinged nerves; teeth acutish, half the length of calyx; petals white, one and a half times as long as calyx, scarcely emarginate; ovary 16-ovuled. June–July.

Stony taluses and rocks. — Caucasus: Cisc., Kuban River system (rivers: Belaya, Laba, Kuban). Endemic. Described from Kuban River. Type in Leningrad.

35. *G. glauca* Stev. in DC. Prodr. I (1824) 353; Rupr. Fl. Cauc. I, 178; Boiss. Fl. Or. I, 540. — *G. repens* M. B. Fl. taur.-cauc. I, 318, non L.

Perennial, glaucescent throughout; stems numerous, 15–20 cm long, divaricately branched nearly from base, glabrous in lower part, glandular-pubescent above; leaves linear-lanceolate, 1.5–2.5 cm long and 2–6 mm broad, acute or obtuse, obscurely veined, crowded in lower part of the stem; bracts scarious; pedicels as long as or shorter than calyx; flowers commonly crowded in 3's at tips of branches, forming a lax panicle; calyx campanulate, 4 mm long, glandular-pubescent; teeth acutish, more than half the length of calyx; petals white, one and a half times as long as calyx, notched; ovary 16-ovuled. August.

Slopes in the subalpine zone. — Caucasus: Main Range (N. Osetia).
Endemic. Described from the Caucasus. Type in Geneva.

Series 7. *Trichotomae* Schischk. — Plants with long trailing or ascending, rarely erect stem; leaves ovate-oblong, 1–3.5 cm broad.

760 36. *G. trichotoma* Wend. in Ind. sem. Hort. Marburg. (1835) no. 3 nom. nud., descr. in Linnaea XI (1837) Litt. 92; Boiss. Fl. Or. I, 541; B. shishkin in Fl. Yugo-Vost. III, 296; Kryl., Fl. Zap. Sib. V, 1090. — *G. trichotoma* β pubescens Fenzl in Ldb. Fl. Ross. I (1842) 297. — *G. scorzonrifolia* Krasan in Hayek Fl. Steierm. I, 313; Asch. et Graebn. Synops. V, 2, 241, non Ser. — *G. perfoliata* M. B. Fl. taur.-cauc. I, 320, non L. — *G. perfoliata* β tomentosa Ser. in DC. Prodr. I (1824) 352. — Ic.: Ldb. Fl. Ross. t. 176.

Perennial; stems decumbent at base, then ascending, 40–100 cm long, profusely branched, puberulent as are the leaves, glabrous in inflorescence; leaves ovate-oblong, 3–7 cm long and 1–3.5 cm broad, 5-veined, at base obsoletely cordate and connate into a very short sheath, obtuse; inflorescence loosely spreading; pedicels capillary, 3–6 times as long as calyx; calyx broadly campanulate, 2–2.5 mm long; teeth ovate, obtuse, scarious-margined, one-third the length of calyx; petals dark red, about twice as long as calyx; capsule subglobose, one and a half times as long as calyx, 10-seeded; seeds minutely tuberculate. July – September.

Solonetz and sandy meadows, solonetztes, and fallows. — European part: Bl., Crim., L. Don, L. V., Transv.; Caucasus: Cisc.; W. Siberia: U. Tob. (S. W.), Irt., Alt.; Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Rumania, Bulgaria, Iran. Described from Centr. Asia and the Caucasus.

37. *G. scorzonrifolia* Ser. in DC. Prodr. I (1824) 352, non Krašan, Hayek, Graebner. — *G. sabulosa* Stev. ex Ser. in DC. Prodr. I (1824) 352, nom. nud. in synonym.; Spreng. Syst. Veget. II (1825) 329; Shishkin in Fl. Yugo-Vost. IV (1930) 297; Grossg., Fl. Kavk. II, 424. — *G. perfoliata* α angustifolia Fenzl in Ldb. Fl. Ross. I (1842) 296. — *G. trichotoma* α glabra Fenzl in Ldb., l. c. (1842) 297.

Perennial; stems rather stout, ascending or procumbent, 40–50 cm long, glabrous; leaves glabrous; lanceolate, acute, 5–10 cm long and 1–2 cm broad, 7- or 8-veined, short-petioled, with axillary fascicles of smaller leaves; inflorescence a loose divaricate panicle; pedicels glandular-pubescent, 5–12 mm long; bracts scarious, often glandular-hairy; calyx campanulate, 3 mm long; teeth obtuse, one-third the length of calyx; petals white or light rose, one and a half times as long as calyx; ovary 8-ovuled; capsule about equaling calyx. July.

Wetish sandy places. — European part: L. V.; Caucasus: Cisc. Endemic. Described from Kizlyar. Type in Geneva.

Note. European authors (Krašan, Graebner), consider *G. scorzonrifolia* Ser. as being synonymous with *G. trichotoma* Wend. Seringe's original specimens in De Candolle's Herbarium, that I have seen, do not leave any doubt that Seringe applied this name to two different plants, namely *G. trichotoma* Wend. and *G. sabulosa* Stev. His description (DC. Prodr. I (1824) 352) fits only *G. sabulosa* Stev., a species that differs markedly from *G. trichotoma* Wend. in its larger flowers, whitish

or faintly roseate (not red) petals, and glandular indument in inflorescence; although it covers two different species, the name *G. scorzonnerifolia* Ser. may be retained for the species with glandular inflorescence, i. e., *G. sabulosa* Stev. (nom. nud.), the latter name being defined by Seringe as synonymous with his *G. scorzonnerifolia*.

38. *G. anatolica* Boiss. et Heldr. in Boiss. Diagn. ser. I, 8 (1849) 57; Boiss. Fl. Or. I, 542; Grossg., Fl. Kavk. II, 424. — *G. hydrophila* Post, Fl. of Syr. Pales. and Sinai (1896) 5. — *G. trichotoma* var. *anatolica* Bornm. Bearb. Knapp. nordw. gesamm. Pfl. (1909) 81. — Exs.: Pl. orient. exs. no. 22.

Perennial; stems sprawling or ascending, 40–100 cm long, densely puberulent in lower part as are the leaves, glabrous in inflorescence; leaves ovate-lanceolate, 2–8 cm long and 0.7–2.5 cm broad, acute or obtusish, 3–5-veined, tapering toward base, the lower pubescent, the upper glabrous; bracts very small, scarious, lanceolate, acute; pedicels equaling or one and a half to twice as long as calyx; calyx broadly campanulate, 2.5 mm long, glabrous, often violet-tinged at summit; teeth obtuse, scarious-margined, half the length of calyx; petals pink, about as long as to one and a half times as calyx; seeds dark-colored, finely striate. July.

Solonetz sites. — Caucasus: S. Transc. Gen. distr.: As. Min., Arm.-Kurd., Iran. Described from Cappodocia. Type in Geneva.

39. *G. yorae* Woron. in Not. Syst. ex Herb. H. Bot. Petrop. V (1924) 62; Grossg., Fl. Kavk. II, 422.

Perennial; stem ascending at base, then erect, 40–70 cm long, branched glandular-pubescent as are the leaves; leaves oblong-elliptic or lanceolate, 2.5–7 cm long and 0.6–2 cm broad, 3–5-veined (the lateral veins obscure), acutish, usually narrower at stem base; upper leaves smaller; bracts triangular-lanceolate, herbaceous, usually colored at summit, densely glandular-pubescent; pedicels capillary, glandular-hairy; calyx campanulate, ca. 2.5 mm long, glandular-pubescent; teeth obtuse, broadly scarious-margined, half the length of calyx; petals white, one and a half times as long as calyx; ovary 8-ovuled; capsule ovoid-globular, 4–4.5 mm long, 2–4-seeded; seeds 1.2 mm long, muricate. July–August. (Plate XLVIII, Figure 2).

Riverside pebbles. — Caucasus: E. Transc. (Iora River valley and Karabakh steppe). Endemic. Described from (Marienfel'd). Type in Leningrad.

40. *G. robusta* Grossh. in Mon. du Jard. bot. de Tifl. Livr. 51 (1920) 30; Grossg., Fl. Kavk. II, 422.

Perennial; rhizome stout; stems numerous, 70–80 cm long, 6–10 mm thick, densely glandular-pubescent, with ascending branches; lower leaves ovate-lanceolate, 10–13 cm long and 2.5–4 cm broad, acute, 5–9-veined, densely glandular-pubescent; upper leaves narrowly lanceolate, shorter; panicle many-flowered; bracts lanceolate, with glandular margins; pedicels glandular-pubescent, 1–1.4 cm long; calyx 3.5–4 mm long, glandular-hairy;

762 teeth triangular, acute, scarious-margined, half the length of calyx; petals white or pale roseate, slightly exceeding to one and a half times as long as calyx, scarcely emarginate; ovary 18–20-ovuled; capsule globose, 4–5 mm in diameter; seeds black, finely tuberculate. June–July.

Dry slopes. — Caucasus: E. Transc. (Vaziani station, and environs of Tbilisi). Endemic. Described from Vaziani station. Type in Tbilisi.

Series 8. **Imbricariae** Fenzl in Ldb. Fl. Ross. I (1842) 292, emend. Schischk. — Stems numerous, crowded, the imbricated bases of dead leaves long-persistent; petals pink or white, twice to three times as long as calyx.

41. **G. tenuifolia** M. B. Fl. taur.-cauc. I (1808) 319; III, 296; Fenzl in Ldb. Fl. Ross. I, 292; Boiss. Fl. Or. I, 539; Rupr. Fl. Cauc., 177; Grossg., Fl. Kavk. II, 420. — ? *Arenaria pulchra* Willd. ex Schlecht. in Ges. Naturf. Fr. Berl. Mag. VII (1816) 212. — Exs.: HFR no. 1312; Pl. orient. exs. no. 134.

Perennial, caespitose; rhizome stoutish, giving rise to numerous stems and short sterile shoots; flowering stems 10–20 cm long, clothed at base with remnants of dead leaves, branched in inflorescence, glabrous; radical leaves numerous, linear, to 10 cm long and 1–1.5 mm broad (in var. *squarrosa* Schischk. 1–2 cm long and 0.5–0.75 mm broad), acute; cauline leaves similar but smaller, shorter than internodes; flowers few, in a terminal corymbiform panicle (in var. *gracilipes* Woron. inflorescence loose and pedicels to 2 cm long); bracts ovate-lanceolate, acuminate, scarious; calyx campanulate, 4–5 mm long, glabrous; teeth ovate-triangular, obtuse or mucronulate, scarious-margined, one-third the length of calyx; petals pink or pale red, more rarely white, more than twice as long as calyx, obovate, notched; ovary 12-ovuled. June–August.

Alpine or more rarely subalpine meadows and rocks. — Caucasus: Gr. Cauc. and W. Transc. Endemic. Described from the Caucasus (Main Range). Type in Leningrad.

42. **G. steupii** Schischk. in Candollea III (1928) 473.

Perennial; rhizome long, stout, creeping, bearing at the top flowering stems and sterile shoots; flowering stems 30–40 cm long, erect, glabrous, simple or slightly branched at summit; lower leaves narrowly linear, 3–10 cm long and 1.5–2 mm broad, glabrous; cauline leaves 4 or 5 pairs, 1.5–3.0 cm long, much shorter than internodes, connate at base; flowers in a loose head; bracts broadly scarious-margined; pedicels 4–6 mm long; calyx 5–6 mm long, glabrous; teeth obtuse, scarious-margined, one-third the length of calyx; petals white, broadly obovate, gradually tapering to claw, twice as long as calyx. End of May, June, July.

763 Rocks. — Caucasus: W. Transc. Endemic. Described from Muzakak Range and Mzymta River Pass. Type in Leningrad.

43. **G. uralensis** Less. in Linnaea IX (1834) 172; Fenzl in Ldb. Fl. Ross. I, 292; Kryl., Fl. Zap. Sib. V, 1088. — *G. uralensis* var. *typica* et var. *glabra* Kryl. in Trav. Soc. Nat. Kaz. IX, 6 (1881) 40. — *Arenaria gmelini* Fisch. in DC. Prodr. I (1824) 172. — *Gypsophila gmelini* Schischk. in Berichte Toms. Abt. Russ. Botan. Gesell. III (1930) 117, non Bge.

Perennial, woody at base, with numerous stems and densely leafy sterile shoots; flowering stems 5–20 cm long, glabrous in lower part, glandular-pubescent above (sometimes glabrous throughout – var. *glabra* Kryl.); radical leaves linear, 1–5 cm long and 0.5–2 mm broad, short-acuminate or obtusish, with prominent midrib and 2 faint lateral veins; cauline leaves 3 or 4 pairs, resembling the radical but smaller; flowers 5–10, in a terminal corymbiform panicle; pedicels equaling or shorter than calyx; bracts linear-lanceolate, long-acuminate, scarious except for green midrib; calyx campanulate, 3–4.5 mm long and 2.5–3 mm broad; teeth ovate, obtuse, scarious-margined, nearly half length of calyx; petals white, twice to thrice as long as calyx; capsule scarcely exceeding calyx; seeds ca. 1.5 mm long, finely tuberculate. July.

Rock crevices and stony slopes. — European part: Ural (lower reaches of Vishera River). Endemic. Described from the Urals (Taganai mountains). Type in Leningrad.

44. *G. sambukii* Schischk. sp. nova in Addenda V, p. 680.

Perennial, glabrous throughout; rhizome 3–5 mm thick, multicapital, bearing numerous flowering stems and sterile shoots; stems 10–20 cm long, ascending at base, then erect, branched in inflorescence; leaves linear, 2–5.5 cm long and ca. 1 mm broad, acutish; cauline leaves 2–4 pairs, connate at base into a short sheath; flowers in a terminal corymbiform panicle; pedicels 2–5 mm long; bracts triangular-lanceolate, scarious; calyx campanulate, 4 mm long; teeth ovate, obtuse, broadly scarious-margined, ciliate, more or less violet-tinged, half length of calyx; petals rose-violet, twice to two and a half times as long as calyx; ovary 14–16-ovuled; capsule ovoid, slightly exceeding calyx; seeds reniform-rounded, ca. 1.5 mm long, sharply tuberculate on the back. August.

Outcrops. — Arctic: Arc. Sib. Endemic. Described from the banks of Medvezhi River. Type in Leningrad.

Series 9. *Elegantes* Schischk. — Annuals or more rarely perennials; stems branched, glabrous; petals white or pink, notched, twice to four times as long as calyx; ovary containing 12–18 ovules.

764

45. *G. elegans* M. B. Fl. taur.-cauc. I (1808) 319; Fenzl in Ldb. Fl. Ross. I, 290; Boiss. Fl. Or. I, 551; Rupr. Fl. Cauc. I, 181; Grossg., Fl. Kavk. II, 418. — *G. producta* Stapf, Die botan. Ergebn. d. Polak'schen Exped. n. Pers. II (1886) 12. — Ic.: Grossh., Sosnow. et Schischk. Fl. Tiflis. I, fig. 84 ad pag. 206; Boiss. Atlas Pl. Jard. t. 36.

Annual, glabrous throughout; stem branched from base or in upper part, 20–50 cm long; leaves thickish, 1-veined, the lower oblong-lanceolate, the median and upper lanceolate to linear-lanceolate, 2–4 cm long and 3–4 mm broad; inflorescence a loose panicle; bracts very small, lanceolate or linear, scarious on the margin or throughout; pedicels filiform, 1–3 cm long; calyx broadly campanulate, glabrous, 3–3.5 mm long; teeth obtuse or minutely mucronulate, scarious-margined, half length of calyx; petals pink, purple-nerved, twice to thrice as long as calyx, rounded or emarginate at apex; ovary 12–16-ovuled; capsule one and a half times as long as calyx; seeds subglobose, compressed laterally, bluntly tuberculate. June–July.



PLATE XLVIII. 1. *Gypsophila capituliflora* Rupr.: flower, petal. — 2. *G. yorae* Woron.: stem node. — 3. *G. lipskyi*, Schischk. — 4. *G. fedtschenkoana* Schischk.: flower. — 5. *G. alsinoides* Bge.

Stony slopes, waterside pebbles, and among crops. — European part: Bl. (Odessa), Crim. (Feodosiya); Caucasus: Gr. Cauc., Cisc., Dag., E. and S. Transc., Tal. **Gen. distr.:** Centr. Eur. (introduced), As. Min., Arm.-Kurd., Iran. Described from Terek River valley and Mount Kazbek. Type in Leningrad.

46. *G. silenoides* Rupr. Fl. Cauc. (1869) 182; Grossg., Fl. Kavk. II, 422. — *G. capillipes* Freyn et Sint. in Oesterr. bot. Zeitschr. XLI (1891) 363. — Exs.: Pl. orient. exs. no. 281.

Perennial; stems ascending or sometimes procumbent, 10–25 cm long, branched from base or from the middle, glabrous; leaves glaucescent, lanceolate, 2–5 cm long and 2–3.5 mm broad, sometimes flaccid, obtusish, 1-veined, glabrous; inflorescence a loose panicle; bracts ovate, acute, scarious except for midrib; pedicels filiform, 1–2.5 cm long; calyx campanulate, 3.5–4 mm long; teeth elliptic-oblong, obtuse, scarious-margined, nearly half length of calyx; petals pink, purple-nerved, twice to thrice as long as calyx, oblong-cuneate, notched; ovary 15- or 16-ovuled; capsule subglobose, slightly exceeding calyx; seeds reniform, black, subglobose, compressed laterally, 1.2 mm in diameter, tuberculate. June–August.

767 Alpine meadows. — Caucasus: Mountains of Centr., E., and W. Transc. **Gen. distr.:** Arm.-Kurd., As. Min. Described from Adzharia (Somliya Mountains). Type in Leningrad.

47. *G. heteropoda* Freyn in Bull. de l'Herb. Boiss. 2-me ser. III (1903) 865; Grossg., Fl. Kavk. II, 418. — *G. modesta* Bornm. in Bull. de l'Herb. Boiss. 2-me ser. V (1905) 62. — *G. nanella* Grossh. in A. Grossh. et B. Schischk. Plantae orient. exs. Fasc. I–VIII (1924) 5. — Exs.: Pl. orient. exs. no. 9.

Annual; stem branched, 3–20(25) cm long, glabrous, the upper internodes somewhat viscid; leaves lance-linear to linear, 1.5–3.5 cm long and 2–4 mm broad, narrowing toward base, gradually acuminate toward apex, 1-veined or obscurely 3-veined; flowers in a loose inflorescence, on pedicels 3–20 mm long; bracts ovate, acute, broadly scarious-margined or scarious throughout; calyx broadly campanulate, 1.5–2.2 mm long; teeth obtuse, scarious-margined, more than half length of calyx; petals white, linear-spatulate, scarcely emarginate, one and a half times to twice as long as calyx; ovary 14–18-ovuled; capsule one and a half times length of calyx; seeds 0.5 mm in diameter, smooth. May–June.

Sandy slopes and consolidated sands. — Caucasus: S. Transc.; Centr. Asia: Ar.-Casp., Kara K., Kyz. K. **Gen. distr.:** N. Iran., Arm.-Kurd. Described from Krasnovodsk. Type in Vienna; cotype in Leningrad.

Series 10. *Grandiflorae* Fenzl in Ldb. Fl. Ross. I (1842) 293, ex parte (sub subdiv.). — Perennials, often woody in lower part; flowers usually numerous, in a loose inflorescence or in a head; petals pink, rarely white, one and a half to four times as long as calyx; ovary containing 8 to 18 ovules. Completely glabrous plants, often glaucous.

48. *G. patrinii* Ser. in DC. Prodr. I (1824) 353; Kryl., Fl. Zap. Sib. V (1931) 1089. — *G. thesiifolia* Ser., l. c. (1824). — *G. gmelini* Bge. in Ldb. Fl.

Alt. II (1830) 128; Fenzl in Ldb. Fl. Ross. I (1842) 293. — *G. gmelini* α patrini, β caespitosa, γ intermedia Turcz. Fl. baic.-dahur. I (1842) 200–201. — *G. acutifolia* β gmelini Rgl. in Bull. Soc. Nat. Mosc. XXXIV (1861) 536. — Ic.: Ldb. Ic. Fl. Ross. V, tab. 402.

768 Perennial, glabrous throughout; taproot stout, multicipital; radical shoots numerous, short, giving rise to numerous herbaceous stems, these erect, 20–60 cm long (rarely 10–15 cm long. — var. *caespitosa* (Turcz.) Schischk.); leaves linear (var. *thesiifolia* (Ser.) Schischk.) or lance-linear, 1–6 cm long and 1–5 mm broad, acute, glaucescent, flat with prominent midrib beneath or keeled and almost trigonous; inflorescence a loose corymbiform panicle; pedicels 0.5–2 cm long; calyx campanulate, 2.5–4 mm long and 2–3 mm broad; teeth obtuse, scarious-margined, nearly half length of calyx; petals whitish-pink, twice to four times as long as calyx, cuneately attenuate at base, obtuse at apex; ovary 12–16-ovuled; capsule broad-ovoid, ca. 4 mm long; seeds to 1.5 mm long, muricate. June–August.

Stony slopes and rocks on pebbly riverbanks. — European part: V.-Kama (S. Urals-Petrovskoe, Khalilovo); W. Siberia: Alt., Irt.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Centr. Asia: Balkh. (Zaisan district), Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** N. Mong. Described from the environs of Ust-Kamenogorsk. Type in Geneva.

49. *G. dahurica* Turcz. ex Fenzl in Ldb. Fl. Ross. I (1842) 294. — *G. gmelini* β *dahurica* Turcz. Fl. baic.-dah. I (1842) 201.

Perennial, glabrous and glaucous throughout; rhizome woody; stems numerous, herbaceous, ascending at base, 50–80 cm long; leaves lance-linear, more rarely linear, 3–6 cm long and 3–7(15) mm broad (var. *angustifolia* Fenzl., 1–2 mm broad), gradually acuminate, narrowing toward base, 3–5-veined, commonly with short leafy branchlets in the axils; inflorescence a contracted corymbiform panicle; pedicels as long as calyx; bracts scarious, lanceolate, gradually acuminate; calyx campanulate, 3–4 mm long; teeth triangular, acutish, scarious, one-third to half length of calyx; petals white or pale rose, twice to thrice as long as calyx; ovary 12–16-ovuled; capsule scarcely exceeding calyx; seeds muriculate. July–August.

Steppe meadows and gravelly steppe slopes. — E. Siberia: Dau.; Far East: Ze.-Bu. (?), Uda. **Gen. distr.:** Mongolia. Described from Nerchinsk. Type in Leningrad.

50. *G. pacifica* Kom., in Bull. Jard. bot. Petrogr. XVI (1916) 167; Kom., Fl. Manchzh. II, 206.

Perennial, much branched, glabrous; stems 60–80 cm long, densely leafy; leaves broadly lanceolate, 3.5–5 cm long and 1–2.5 cm broad, sessile, clasping at base, acuminate or more rarely obtusish; inflorescence divaricately paniculate; bracts lanceolate, acute, scarious; calyx narrowly campanulate, 2–3 mm long; teeth obtuse, broadly white-margined, one-third length of calyx; petals pink, twice to two and a half times as long as calyx; ovary 16-ovuled; capsule subglobose, 3 mm in diameter; seeds reniform, ca. 1 mm long, bluntly tuberculate. July–September.

Rocky slopes and crevices of seaside cliffs. — Far East: Uss., Okh. (?). **Gen. distr.:** Manchuria. Described from the Rakovka River valley and Taodema River. Type in Leningrad.

69 51. *G. capituliflora* Rupr. in Osten-Sacken et Ruprecht, Sertum tianschanicum (1869) 40; Schischk. in Trav. du Mus. bot. de l'Acad. Sc. de l'URSS XXIV (1932) 34. — *G. pamirica* Preobr. in Bull. Jard. bot. Petrogr. XVI (1916) 181. — *G. semiglobosa* Czernjak. in Not. Syst. ex Herb. Hort. bot. Petrop. III (1922) 129.

Perennial, tufted; flowering stems numerous, 6–25 cm long, glabrous, glaucous, simple or with 1–2 branches at summit; leaves thickish, narrowly linear, subtriquetrous, 1–3 cm long and 0.5–1 mm broad, 1-veined, acute, glabrous; flowers in a terminal head 1–2 cm in diameter; bracts scarious, ovate, acuminate or abruptly terminating in a short point; pedicels slender, ca. 1 mm long; calyx campanulate, 3.5–5 mm long; teeth triangular, acute, scarious-margined, one-third to half length of calyx; petals pale rose or whitish, one and a half times as long as calyx; ovary 18-ovuled; capsule oblong, about equaling calyx; seeds globose, dark purple. July–August. (Plate XLVIII, Figure 1).

Stony slopes in the alpine zone. — Centr. Asia: T. Sh., Pam.-Al. Gen. distr.: Dzu.-Kash. Described from the Arpa River valley (Tien Shan). Type in Leningrad.

52. *G. preobrashenskyi* Czernjak. in Not. Syst. ex Herb. Horti Petropol. III (1922) 126.

Perennial, tufted, 15–20 cm in diameter; stems 30–45 cm long, suberect, sometimes subsecundly branched at summit, glabrous, glaucous; leaves linear, 4.5–6 cm long and 1–1.5 mm broad, thickish, subtrigonous, glabrous; flowers at tips of stems and of 2 or 3 branches in a capitate inflorescence 2–2.5 cm in diameter; pedicels 1–1.5 mm long; bracts membranous, ovate, to 3 mm long, short-acuminate; calyx tubular, 5–5.5 mm long, and 3 mm broad, glabrous; teeth lanceolate, acute, one-third length of calyx; petals pale rose, one and a half times as long as calyx, cuneate-linear, scarcely emarginate; ovary 12–14-ovuled; capsule oblong, slightly exceeding calyx; seeds reniform, wrinkled. July–September.

Taluses and stony slopes. — Centr. Asia: W. T. Sh., E. Pam.-Al. Endemic. Described from Talass Ala-Tau (Keinar valley near Dzhilda-Gulat. Type in Leningrad.

53. *G. lipskyi* Schischk. in Candollea III (1928) 475.

Perennial, woody at base, profusely branched; stems erect, 10–20 cm long, covered in lower part with scattered thickish hairs, glabrous above; leaves narrowly linear, ca. 1 cm long and 0.5–0.7 mm broad, thickish, 1-veined, glabrous, scabrous-margined, much shorter than internodes; bracts ovate-lanceolate, acute, herbaceous, narrowly scarious-margined; pedicels 3–10 mm long; flowers in few-flowered corymbs; calyx broadly campanulate, 3 mm long, glabrous; teeth oblong, obtuse, scarious-margined, half length of calyx; petals pink, one and a half times to twice as long as calyx, oblong-linear, notched; ovary 8-ovuled. June. (Plate XLVIII, Figure 3).

70 Dry slopes. — Caucasus: E. and S. Transc. Endemic. Described from Hakhichevan district (Ganza). Type in Leningrad.

*54. *G. brachypetala* Trautv. in A. H. P. II, 2 (1873) 471; Boiss. Suppl., 85; Grossg., Fl. Kavk. II, 420.

Perennial, woody at base, profusely branched; herbaceous stems erect, 8–15 cm long; radical leaves densely crowded, linear, 5–6 cm long and

2–3 mm broad, acute, the margin and midrib scabrous; cauline leaves similar but smaller; bracts small, acute, herbaceous, scarious-margined; flowers 10–15 in a rather dense corymbose terminal inflorescence; pedicels glabrous, shorter than to very slightly longer than calyx; calyx campanulate, 3.5–4.5 mm long, glabrous; teeth ovate, obtuse or mucronulate, half length of calyx; petals pale rose, slightly exceeding to one and a half times as long as calyx, rounded at apex; ovary 8-ovuled. July.

Southern slopes in the alpine zone. Occurring in border areas of Turkey, in the former Kars Region. Endemic. Described from Ashikh-Dade. Type in Leningrad.

Series 11. *Hispidae* Schischk. — Calyx 4–7 mm long; leaves ovate or lanceolate; plants covered with long patulous hairs.

55. *G. hispida* Boiss. Diagn. ser. I, 1 (1842) 11; Fl. Or. I, 552; Grossg., Fl. Kavk. II, 419. — *G. ixodes* Hausskn. in Bornm. It. pers. turc. in Beihefte zum botan. Centralbl. XXVIII, Abth. II (1911) 137. — *G. xanthina* Bornm. et Woron. in Monit. du Jard. bot. de Tiflis, livr. 32 (1914) 1.

Perennial, glaucescent, glabrous in lower part, glandular-hairy above; stems numerous, erect, 20–40 cm long, branched from the middle; leaves glaucous, the lower acute, obscurely 3-veined, glabrous, the upper smaller, linear-lanceolate to sublinear, densely glandular-pubescent; bracts subsetaceous, herbaceous; pedicels filiform, erect, 5–20 mm long, densely hairy; calyx tubular-campanulate, 4–6 mm long, long-villous; teeth ovate, obtuse, broadly scarious-margined, half length of calyx; petals lemon-yellow or almost white, one and a half times to twice as long as calyx, notched; ovary 8–12-ovuled. June–July.

Stony and dry clayey slopes. — Caucasus: S. Transc. Gen. distr.: Arm.-Kurd., As. Min. Described from Cappadocia. Type in Geneva.

56. *G. fedtschenkoana* Schischk. in Not. Syst. ex Herb. Hort. Petrop. VI, 3 (1926) 7. — Exs.: HFR no. 2986.

771 Perennial; stem branched from base, rather stout, erect or ascending, 40–80 cm long, covered with long patulous glandular hairs, viscid; leaves connate at base in pairs, ovate or lanceolate, 3–6 cm long and 1–3 cm broad, many-veined, glabrous or glandular-pubescent; inflorescence an open panicle; pedicels patulous-hairy, equaling to twice or thrice as long as calyx; calyx tubular-campanulate, densely glandular-pubescent; teeth obtuse, 3-nerved, half length of calyx; petals pink, twice as long as calyx, notched; ovary 16-ovuled; capsule subglobose, many-seeded, shorter than calyx. May–June. (Plate XLVIII, Figure 4).

Steppe slopes. — Centr. Asia: T. Sh. (Kugart Pass), Pam.-Al. (Gazimailik). Endemic. Described from the Kugart River (Kirghizia). Type in Leningrad; cotype in Tomsk.

Section 5. *BUCHARICAE* B. Fedtsch. in A. H. P. XXXII, 1 (1916) 7. — Taproot tuberous; calyx tubular-campanulate; ovary containing 3–6 ovules.

57. *G. bucharica* B. Fedtsch. in A. H. P. XXXII, I (1911) 7. — Exs.: Edit. Hort. Bot. Petrop. no. 10.

Perennial; taproot elongated, much thickened, the thickened part 10 cm long and 3–4.5 cm in diameter; stems 3–5, branched, leafy almost from base; leaves oblong-lanceolate, 3–6 cm long and 5–8 mm broad, sessile, clasping, glabrous; inflorescence an open panicle; pedicels filiform, 1–3 cm long, thickened below the flower; bracts lanceolate, 1.5–2 mm long, acute, scarious-margined and often violet-tinged; calyx tubular-campanulate, 7–10 mm long, glabrous, with broad membranous hairs on the internerves; teeth rather short, obtuse, scarious-margined; petals rose-purple, narrowly oblong, twice as long as calyx, scarcely and irregularly denticulate at apex; ovary 14-ovuled; capsule ovoid, 6 mm long; seeds triangular-reniform, ca. 2 mm long, almost smooth. May–June.

Dry slopes at altitudes of about 2,000 m. — Centr. Asia: Pam.-Al. (Baldzhuan in the Vakhsh River valley and Sanglak Range). Endemic. Described from the Vakhsh River valley. Type in Leningrad.

Economic importance. Deserving introduction into cultivation as ornamental for its beautiful flowers.

58. *G. intricata* Franch. in Annal. d. Sc. Nat. bot. XV (1883) 238.

Perennial; tubers oblong or globose, usually several, 1–5 cm in diameter; stem profusely branched from base, glaucous, glabrous; leaves connate at base, oblong, 1.5–3 cm long and 3–7 mm broad, acute or acuminate, with prominent midrib; inflorescence an open panicle, the slender branches glabrous or in the forks glandular-hairy; pedicels filiform, 1–2 cm long, often violet-tinged, glandular-pubescent or glabrous; bracts white-scarious; calyx tubular-campanulate, 3 mm long, glabrous, with ovate teeth; petals white, twice to thrice as long as calyx, narrowly oblong, notched; ovary 3-ovuled; capsule globose, exceeding calyx; seeds round, smooth, to 1.5 mm in diameter. May–July.

Argillaceous and calcareous slopes and taluses. — Centr. Asia: Pam.-Al. Endemic. Described from Chukalik Pass opposite Urmitan. Type in Paris.

Section 6. *PSEUDOACANTHOPHYLLUM* Boiss. Fl. Or. I (1867) 537. —

Calyx oblong-campanulate; petal claw gradually passing into a spatulate limb; ovary containing 8–10 ovules; capsule 1- or 2-seeded. Undershrubs with acicular spinescent leaves.

59. *G. popovii* Preobr. in Pochvennyye ekspeditsii v bass. r. r. Syr-Dar'i i Amu-Dar'i, no. II (1916) 47, Plate 4.

Perennial, woody at base, profusely branched; flowering branches numerous, 20–25 cm long, densely leafy in lower part, the upper internodes elongated; leaves trigonous, flat above, convex beneath, acicular-spinescent, spreading, minutely puberulent or glabrous, finely scaberulous on the margin, 1–2.5 cm long, often with abbreviated sterile branchlets in the axils; lower leaves marcescent, persisting as brown prickles; flowers in 3–10-flowered terminal and axillary capitate inflorescences; pedicels very short; heads subtended by involucre of 2 navicular terminal leaves; bracts broad-ovate, half as long as calyx, abruptly or gradually acuminate, with a broad-scarious margin; calyx puberulent, narrowly campanulate, 5–7 mm long and

1.5–2 mm broad; teeth lanceolate, acuminate, scarious-margined, one-third length of calyx; petals spatulate-linear, scarcely longer than calyx; seeds reniform, to 2 mm long, minutely tuberculate. May.

Rocks. — Centr. Asia: Pam.-Al. (Zeravshan Peak), Mtn. Turkm. (Kugitang). Described from Kugitang. Type in Leningrad.

Subgenus 2. **DICHOGLOTTIS** (Fisch. et Mey.) Endl. Gen. pl. (1840) 972; Boiss. Fl. Or. I (1867) 536, part.; sect. *Paniculiformes b. effusae* Subsect. I. *Drypidipetala* Will. in Journ. of Bot. XXIV (1889) 326. — Gen. *Dichoglottis* Fisch. et Mey. Ind. I sem. H. Petrop. (1835) 25. — Calyx dissected nearly to base; petal claw not constricted at summit, gradually enlarged into the limb, this 2-fid or 2-parted to below the middle; radicle of seed very short, not prominent. Annuals.

60. *G. linearifolia* (Fisch. et Mey.) Boiss. Fl. Or. I (1867) 550, ex parte; Shishk. in Fl. Yugo-Vost. IV, 299. — *Dichoglottis linearifolia* Fisch. et Mey. Index I Hort. Petrop. (1835) 26. — *G. szowitsii* β *glandulosa* Fenzl in Ldb. Fl. Ross. I (1842) 289. — Ic.: Claus, Ind. in Göbel. It. II (1838), t. 2, f. 1.

773 Perennial, glandular-pubescent throughout; stem slender, branched from base, 8–25 cm long; leaves linear or spatulate-linear, 1–2 cm long and 1–2 mm broad, obtuse; bracts small, herbaceous, slightly recurved; pedicels filiform, 1–2 cm long; calyx ca. 2 mm long; teeth oblong-linear, obtuse, narrowly scarious-margined, three-quarters length of calyx; petals white, linear, one and a half times as long as calyx, 2-fid; ovary 12–16-ovuled; capsule scarcely exceeding calyx; seeds ca. 0.5 mm in diameter, minutely tuberculate. June–July.

Gypseous hills and desert steppes. — European part: L. V.; W. Siberia: U. Tob. (S. W.); Centr. Asia: Ar.-Casp. Endemic. Described from the E. coast of the Caspian Sea. Type in Leningrad.

61. *G. spathulifolia* (Fisch. et Mey.) Fenzl in Ldb. Fl. Ross. I (1842) 290; Boiss. Fl. Or. I, 552. — *Dichoglottis spathulifolia* Fisch. et Mey. ex Fenzl, l. c.

Perennial, glandular-pubescent throughout; stem branched from base, 7–15 cm long, leafy up to the summit; leaves spatulate to oblong-spatulate, 2–2.5 cm long and 6–10 mm broad, petiolate, covered with white articulate hairs interspersed with glandular; flowers in the leaf axils; pedicels filiform, 3.5–7 mm long, thickened at summit; calyx oblong, 5–7 mm long, to 3 mm broad; teeth oblong, obtuse, narrowly membranous-margined; petals white, one and a half times as long as calyx, linear-spatulate, 2-fid or pectinate-toothed; stamens 5, as long as calyx; ovary 15–30-ovuled; capsule oblong, scarcely exceeding calyx; seeds reniform, bluntly tuberculate. May.

Stony slopes. — Centr. Asia: Ar.-Casp. Endemic. Described from the E. coast of the Caspian Sea. Type in Leningrad.

62. *G. alsinoides* Bge. in Arb. Naturf. Ver. Riga I, 2 (1847) 179; Boiss. Fl. Or. I, 549.

Perennial; stem slender, 10–20 cm long, divaricately long-branched almost from base, glandular-hairy in lower part as are the leaves or the plant glabrous throughout; leaves linear-lanceolate, 1–1.5 cm long and 1.5–3 mm broad, 1-veined, subacute; bracts scarious, triangular, ca. 0.5 mm long; pedicels filiform, glabrous, 5–30 mm long; calyx campanulate, 2–2.5 mm long, glabrous; teeth obtusish, scarious-margined, 3-nerved, nearly length of calyx; petals white, cleft to below the middle into oblong-linear lobes, as long as or longer than calyx; ovary 6-ovuled; capsule globose, about equaling calyx; seeds ca. 1 mm in diameter. May–June. (Plate XLVIII, Figure 5).

Taluses, dry slopes, and pebbles. — Centr. Asia: Kyz. K., Kara K. Gen. **distr.:** Iran. Described from Yan-Dara. Type in Leningrad.

774 Subgenus 3. **MACRORRHIZAEA** Boiss. Fl. Or. I (1867) 536. — Calyx obconic-tubular or oblong; teeth acute or obtuse, one-fourth to one-third length of calyx; petals entire or scarcely emarginate; claw without constriction, gradually enlarged into the limb; radicle of seed elongated. Annuals.

Series 1. **Murales** Schischk. — Indument consisting of simple hairs; calyx very small, with obtuse teeth.

63. *G. muralis* L. Sp. pl. (1753) 408; Fenzl in Ldb. Fl. Ross. I, 288; Boiss. Fl. Or., I, 554; Shmal'g., Fl. I, 132; Kryl., Fl. Zap. Sib. V, 1085. — *Saponaria muralis* Lam. Fl. Franc. II (1781) 154. — *Gypsophila purpurea* Gilib. Fl. Lithuan. II (1781) 154. — *G. agrestis* Pers. Syn. I (1805) 492. — *Dichoglottis muralis* Jaub. et Spach, Illustr. I (1842) 13. *G. serotina* Haune in Bot. Bibl. (1801), t. 152. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 239. — Exs.: HFR no. 705 et 1957.

Annual; stem solitary, usually branched from the base, 5–20 cm long, short-hairy in lower part as are the leaves, glabrous above; leaves linear 1–2.5 cm long and 1–3 mm broad, 1-veined, attenuate at both ends; flowers in the axils of branches and terminal in forks of the stem; pedicels slender, capillary, many times as long as calyx; calyx broadly campanulate, glabrous, 2.5–3 mm long; teeth obtuse, one-quarter length of calyx; limb of petal pink, with darker nerves, commonly twice as long as calyx, abruptly contracted into a pale green claw, crenate or emarginate at apex; capsule ovoid, with numerous very small seeds. May–July.

Fields, weed-infested crops, roadsides, habitations, water meadows, and borders of solonchaks. — European part: all regions except Arctic; W. Siberia: Ob, U. Tob., Irt., Alt.: E. Siberia: Ang.-Say.; Far East: Uss. **Gen. distr.:** Centr. and Atl. Eur., Med., Bal.-As. Min. Described from Sweden, Germany, and Switzerland. Type in London.

64. *G. stepposa* Klok. in Journ. Soc. Bot. de Russie VI (1921) 137; Not. Syst. Herb. Hort. Petropol. IV (1923) 95; Ukrainskii Bot. Zhurnal II (1924) 44. — *G. muralis* var. *stepposa* Schischk. in Fl. Yugo-Vost. IV, (1930) 300. — Exs.: H. F. A. M. no. 125.

Annual; stem solitary, erect, 10–20 cm long, branched from the middle, puberulent in lower part, glabrous above; leaves linear, 10–17 cm long and 1 mm broad, acute, somewhat fleshy, glaucescent; flowers in the leaf axils and at tips of branches; pedicels capillary, several times as long as calyx; calyx tubular, 3.5–4 mm long and 1.5 mm broad, not enlarged at summit,

glabrous, ca. 2.5 mm long; teeth obtuse, one-quarter length of calyx; petal limb almost white, with a very small pink spot, narrowly cuneate and sometimes sublinear, gradually passing into the claw; capsule ovoid, equaling calyx. June—August.

- 775 Dry and solonchak steppes. — European part: Bl., V.-Don (Kupyansk district), L. Don; W. Siberia: U. Tob., (Orsk, Iletsk district); Centr. Asia: Syr D., Balkh. Endemic. Described from the Ukraine (Kislovskaya Stantsiya). Type in Kharkov; cotype in Leningrad.

Series 2. *Floribundae* Schischk. — Indument consisting of glandular hairs; calyx 3.5–4 mm long, with acute teeth.

65. *G. floribundae* (Kar. et Kir.) Turcz. ex Ldb. Fl. Ross. I, 755 (1842); Boiss. Fl. Or. I (1867) 553; Kryl., Fl. Zap. Sib. V, 1086. — *Dichoglottis floribunda* Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 165. — *Saponaria floribunda* Boiss. Diagn. ser. II, 1 (1854) 70.

Annual; stem slender, 5–25 cm long, branched from base, covered with scattered glandular hairs; leaves linear, 0.5–2 cm long and 0.5–3 mm broad, acute, tapering toward base, glandular-pubescent all over or merely on the margins; inflorescence loosely paniculate; pedicels filiform, glandular-hairy, 2.15 mm long; calyx oblong-oval, 3.5–4 mm long and 1.5 mm broad, glandular-pubescent; teeth triangular, acute, narrowly scarious-margined, one-third length of calyx; petals pink or whitish, very slightly longer or shorter than calyx, linear, 2-fid or notched; ovary 12–15-ovuled; capsule oblong-ovoid, about equaling calyx; seeds reniform, 0.6–0.75 mm in diameter, finely tuberculate. June–July.

Stony slopes and grayish-brown loams. — Centr. Asia: Balkh., Dzu.-Tarb., T. Sh., Pam.-Al. Gen. distr.: Iran. Described from Arganatin mountains (N. E. Kazakhstan). Type in Moscow.

66. *G. filipes* (Boiss.) Schischk. comb. nova. — *Saponaria filipes* Boiss. Diagn. Ser. II, I (1854) 69. — *S. dichotoma* Kom. in Trav. Soc. Nat. Pétersb. XXVI (1896) 120, non *G. dichotoma* Bess. (1809). — *Gypsophila floribunda* β . major Boiss. Fl. Or. I (1867) 553.

Perennial; stem branched from base, 7–22 cm long, glandular-pubescent; lower leaves ovate or linear-lanceolate, long-petioled, 1–2.3 cm long including petiole, 2.5–9 mm broad, glaucescent, glandular-pubescent or glabrate, subobtuse or acute; pedicels filiform, glandular-pubescent, 5–25 mm long; inflorescence a loose forked panicle; calyx 4 mm long, somewhat accrescent after flowering, glandular-pubescent, with narrow membranous stripes; teeth triangular, acute, one-fifth length of calyx; petals purplish-red, equaling or scarcely longer than calyx, linear, notched; capsule equaling or slightly exceeding calyx; seeds reniform, ca. 1 mm in diameter, smooth, striate. June–July.

Taluses and stony slopes, at altitudes between 1,800 and 2,700 mm. — Centr. Asia: Pam.-Al. Gen. distr.: Afghanistan. Described from Afghanistan. Type in Geneva.

- *67. *G. picta* Boiss. in Tchih. As. Min. (1860) 202; Fl. Or. I, 554. — *G. floribunda* Grossg., Fl. Kavk. II, 418, non Turcz.

Annual; stem branched from base, 8–28 cm long, glandular-hairy, sometimes glabrous in lower part; leaves oblong-spatulate, somewhat fleshy, glabrous or glandular-hairy, 8–20 mm long and 4–7 mm broad, the lower long-petioled, the upper sessile, tapering toward base, smaller and narrower; pedicels filiform, 4–10 mm long; flowers in loose dichasia at tips of stem and branches, forming a paniculate inflorescence; calyx tubular-campanulate, 3–4 mm long, in fruit 4–5 mm long, glandular-pubescent; teeth obtuse, scarious-margined, one-quarter length of calyx; petals violet-rose when dry, linear-cuneate, slightly exceeding to one and a half times as long as calyx, rounded at apex; ovary 14–16-ovuled; capsule oblong, slightly exceeding to one and a half times length of calyx; seeds rounded-reniform, rugose-tuberculate, ca. 1 mm in diameter. June–July.

Taluses, stony and clayey-stony slopes. So far unknown in the USSR, but occurring in the former Artvin district. *Gen. distr.*: Arm.-Kurd. (Gyumyush-Khan). Described from Gyumyush-Khan. Type in Geneva.

Subgenus 4. **HAGENIA** (Moench) A.Br. in Flora XXVII (1843) 383; Boiss. Fl. Or. I (1867) 537. — *Gen. Hagenia* Moench, Meth. (1794) 61. — Subgen. *Pseudosaponaria* Will. in Journ. of Bot. XXVII (1889) 322. — Calyx oblong-campanulate; petal claw long, attenuate at summit and clearly delimited from the limb; radicle of seed short, not prominent. Annuals.

68. *G. porrigens* (L.) Fenzl in Endl. Gen. Plant. I (1836–41) 972; Boiss. Fl. Or. I, 557; Grossg., Fl. Kavk. II, 419. — *Saponaria porrigens* L. Mant. II (1771) 239. — *Silene porrigens* L. Syst. Nat. III (1756) 230; Gouan, Illustr. (1773) 29. — *Hagenia porrigens* Moench, Meth. (1794) 61. — Ic.: Jacq. Hort. Vindob., tab. 109. — Exs.: Fl. cauc. exs. no. 268.

Annual; stem branched, 15–80 cm long, densely leafy, glabrous in lower part, profusely covered in upper part and in inflorescence, as are the leaves with hairs 1.4 mm long; leaves broadly lanceolate, glabrous or initially pubescent, 3–5-veined, acute; median cauline leaves 6–9 cm long and 1–2 cm broad; pedicels filiform, glabrous, 1–3 cm long, spreading after flowering, borne in the axils of acute terminal leaves; calyx oblong-campanulate, 5–6 mm long, covered with long patulous hairs; accrescent in fruit; teeth obtuse, scarious-margined, one-quarter length of calyx; petals white, twice as long as calyx; limb cuneate, gradually passing into a distinct claw; ovary 18–20-ovuled; capsule broad-ovoid, equaling calyx; seeds black, 1–1.3 mm in diameter, muricate. April–June.

Fields and weed-infested places: Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm. *Gen. distr.*: As. Min., Arm.-Kurd., Iran, Mesopotamia, W. Europe (introduced). Described from the Orient. Type in London.

Genus 494. **TUNICA*** (HALL.) SCOP.**

Scop. Fl. Carn II, 1 (1772) 298.

Flowers small, in a loose inflorescence; calyx tubular or campanulate, 5-toothed, with 15 nerves arranged in groups of 3; petals white or pink, with

* From Latin *tunica*, coat, cover, skin.

** Treatment by S.G. Gorshkova.

elongated claw and entire or slightly emarginate limb; stamens 10; styles 2; capsule dehiscing by 4 teeth. Perennial or annual herbs, glabrous or covered with simple or glandular hairs; stems erect or ascending, simple or branched; leaves opposite, exstipulate, linear-subulate or linear to narrowly linear.

1. Perennial plants; stems numerous, paniculately branched; flowers with 4 bracts at base of calyx; petals about one and a half times to twice as long as calyx 1. *T. saxifraga* (L.) Scop.
- + Annual or biennial plants; stems solitary or several, branched; flowers ebracteate; petals slightly longer than calyx 2.
2. Glabrous biennial; branches more or less appressed to stem; leaves of the dense basal rosette lanceolate; cauline narrowly linear; calyx campanulate, with 5 blunt ribs and short-triangular acute teeth 2. *T. stricta* (Bge.) Fisch. et Mey.
- + Annual; stem branched, glandular-pubescent; all leaves subulate-linear; calyx obconic, prominently 5-ribbed, the ribs produced into a long point 3. *T. pachygona* Fisch. et Mey.

1. *T. saxifraga* (L.) Scop. Fl. Carn. II, 1 (1772) 309; Boiss. Fl. Or. I, 519; Shmal'g., Fl. I, 130; Grossg., Fl. Kavk. II, 424. — *Gypsophila saxifraga* L. Sp. pl. ed. 2 (1762) 584. — *Dianthus saxifraga* L. Sp. pl. (1753) 413. — *Tunica ciliata* Dulac, Fl. Haut.-Pyr. (1867) 260. — *T. arenicola* Nym. Consp. (1878) 100. — *T. bicolor* Jord. et Four. Brev. Pl. Nov. fasc. I (1866) 10. — *T. xerophila* Jord. et Four. Brev. Pl. Nov. fasc. 1 (1866) 10. — Ic.: Rchb. Ic. Fl. Germ. VI (1844) tab. 247, f. 5006; Hegi Ill. Fl. Mitt.-Eur. III (1909) tab. 102, f. 2. — Exs.: Fl. stiriaca exs. no. 956.

778 Perennial, glabrous, sometimes pubescent at base; stems numerous, ascending or more rarely erect, paniculately branched, 10–50 cm long; leaves narrowly linear, acute, 4–12 mm long and 0.5 mm broad, sharply scabrous on the margin; flowers small, in loose few-flowered cymes; bracts 4 at base of calyx, scarious, ovate-lanceolate, acuminate, with a prominent midnerve, half the length of the calyx; pedicels to 14 mm long; calyx campanulate, 4–4.5 mm long and 2 mm broad, 5-angled; teeth ovate, obtuse; petals pink or white, about twice as long as calyx, cuneately attenuate at base; capsule ovoid, dehiscing by 4 valves nearly to the middle; seeds small, oblong-ovaloid, pointed at summit, dark brown, minutely alveolate. June–July–August. (Plate LV, Figure 6).

Sandy, pebbly, and stony places; dry slopes. — Caucasus: W., E., and S. Transc., Tal. Gen. distr.: Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from Europe. Type in London.

2. *T. stricta* (Bge.) Fisch. et Mey. Ind. Sem. Hort. Petrop. IV (1837) 50; Boiss. Fl. Or. I, 521; Grossg., Fl. Kavk. II, 425; Kryl., Fl. Zap. Sib. V (1931) 1094–1095. — *Gypsophila stricta* Bge. in Ldb. Ic. Pl. Fl. Ross. I (1829) tab. 5; in Ldb. Fl. Alt. II (1830) 129. — *Dianthus recticaulis* Ldb. Fl. Ross. I (1842) 287. — Ic.: Ldb., l. c., I (1829) tab. 5. — Exs.: Bornm. fl. exs. Anatoliae or. no. 184.

Biennial, herbaceous, glabrous; stems solitary to several, erect, branched, 12–40 cm long; branches alternate, more or less appressed to stem; leaves

narrowly linear, acute, 3.5 cm long and 2–2.5 mm broad, acute, those of the dense basal rosette lanceolate, acuminate, scabrous-margined; flowers small, ebracteate, in a loose panicle; pedicels 10–12 mm long; calyx campanulate, 3–4 mm long and 2–2.5 mm broad, with 5 green blunt ribs; teeth short-triangular, acute; petals white, oblong-obovate, slightly longer than calyx; capsule oblong-ovaloid, dehiscent by 4 teeth; seeds very small, ovate, compressed, minutely granulate, light brown. May–June. (Plate LV, Figure 5).

Stony, pebbly, and dry mountain slopes, sandy-pebbly banks, and open pine woods. — Caucasus: W., E., and S. Transc.; W. Siberia: Alt.; E. Siberia: Yenisei; Centr. Asia: Dzungaria-Tarbagatai, Pamir-Alai, T. Sh. **Gen. distr.:** Bal.-As. Min., Iran. Described from W. Siberia, from the Irtysh River. Type in Leningrad.

3. *T. pachygona* Fisch. et Mey. Ind. Sem. Hort. Petrop. IV (1837) 50; Boiss. Fl. Or. I, 522; Grossg., Fl. Kavk. II, 424. — Exs.: Bornmüller, pl. exs. Anatoliae or. no. 190.

Annual; stem erect, branched, to 10–45 cm long, glandular-pubescent; leaves subulate-linear, glabrous, acute, 7–30 mm long and 0.5–1 mm broad, with serrulate-scabrous margin; flowers few, small, ebracteate, in a loose inflorescence; pedicels elongated; calyx obconic, 7–8 mm long, and 2–4 mm broad, with 5 prominent nerves produced into a long point; teeth 5, ovate-subulate; petals white, sometimes reddish beneath, oblong, slightly longer than calyx; capsule oblong-obovoid; seeds small, brown, smooth, winged. May.

Dry slopes. — Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm. **Gen. distr.:** Bal.-As. Min., Iran. Described from Anatolia (Tokat). Type in Leningrad.

Genus 495. **KOHLRAUSCHIA*** KUNTH **

Kunth, Fl. Berol. ed. 2, I (1838) 108.

Flowers in dense heads with 6 scarious bracts at base; calyx tubular, with 5 obtuse teeth; petals unguiculate, with small entire limb; stamens 10; styles 2; capsule 4-toothed. Herbaceous plants; stems generally numerous, rather long; leaves linear, opposite, sessile, connate at base.

1. *K. prolifera* (L.) Kunth, Fl. Berol. ed. 2, I (1838) 108; Grossg., Fl. Kavk. II, 425. — *Dianthus prolifera* L. Sp. pl. (1753) 410; Ldb. Fl. Ross. I, 286. — *Tunica prolifera* Scop. Fl. Carn. ed. II, 1 (1772) 299; Boiss. Fl. Or. I, 516; Shmal'g., Fl. I, 129. — Ic.: Rchb. Ic. Fl. Germ. VI, tab. 247, f. 5009; Hegi, Fl. Mitt.-Eur. III (1909) tab. 102, f. 1. — Exs.: Fl. Hung. exs. no. 150; Fl. Exs. Reipubl. Bohem.-Sloven. no. 26.

Annual, glabrous; stems erect, simple or branched, bluntly 4-angled, 10–50 cm long; leaves linear, acute, 2.5–5 cm long and 1 mm broad, scabrous-margined; flowers in capitate inflorescences surrounded by 6 scarious bracts, of these the two outermost half as long as the others, mucronulate, the inner

* Named for the history teacher, Kohlrausch, of Hannover (died in 1867) or the physicist Kohlrausch of Erlangen (died in 1858).

** Treatment by S. G. Gorshkova.

obtuse and exceeding calyx; calyx membranous, tubular, 7–9 mm long and 3–4 mm broad, with narrow obtuse teeth; petals pink or reddish-lilac, with elongated claw and obovate emarginate limb; capsule oblong-ovaloid, accrescent and rupturing calyx; seeds small, flat, rugose. June–July. (Plate LV, Figure 7).

Stony and sandy places, and dry steppes. — European part: Bl., Crim.; Caucasus: Cisc., Dag., E. and S. Transc. Gen. distr.: Centr. Eur., Bal.-As. Min., Iran. Described from Europe. Type in London.

Genus 496. **ACANTHOPHYLLUM*** C. A. M.

780

C. A. M. Verzeichn. Pfl. Cauc. (1831) 210.

Calyx tubular or turbinate, 5-toothed, scarious between the teeth; petals 5, usually colored, rarely white, the oblong-obovate or obcuneate limb gradually passing into a linear claw; stamens 10, often with exerted anthers; ovary unilocular, 4–10-ovuled, short pediceled; styles 2, membranous in lower part, short-cylindric or subglobose, as a result of abortion 1- or 2-seeded, irregularly splitting transversely or dehiscing by teeth.

Economic importance. Many species of the genus *Acanthophyllum* contain saponin in their underground organs and are sometimes used as a soap substitute.

- 1 Inflorescence densely capitate, often subspherical, rarely densely corymbose; leaves mostly subulate, rarely flat, usually acerose 2.
- + Inflorescence paniculate or loosely corymbose; leaves usually flat, not acerose 28.
2. The capitulum surrounded by scarious oval obtuse or softly mucronulate bracts; individual flowers furnished with similar bracts 3.
- + Involucral leaves and bracts lanceolate or navicular, herbaceous, stiff, subulate-acerose; leaves subulate-acerose 6.
3. Stems glandular-pubescent; leaves lanceolate, 5–10 mm broad, rounded at apex 24. *A. korolkowii* Rgl.
- + Stems covered with simple hairs or glabrous; leaves linear, 0.5–2 mm broad, acute 4.
4. Plant glabrous throughout, sessile, 35–45 cm high; calyx cylindrical, 7.5–8.5 mm long 25. *A. elongatum* (Preobr.) Schischk.
- + Plant more or less pubescent, 10–25 cm high; calyx campanulate, 4–6 mm long 5.
5. Calyx 4–5 mm long, greenish, with lanceolate long-acuminate teeth; leaves 1.5–2.5 cm long 26. *A. serawschanicum* Golenk.
- + Calyx 6 mm long, violet-tinged, with broadly triangular acute teeth; leaves 1–1.7 cm long 27. *A. coloratum* (Preobr.) Schischk.
6. Flowers small; calyx 3–4 mm long, in compact spherical heads 4–12 mm in diameter 7.
- + Flowers large; calyx 5–9 mm long, in loose corymbose-capitate nonspherical inflorescences 8.
7. Plant scabrid-pubescent throughout; flower-heads 7–12 mm in diameter; calyx 4 mm long 28. *A. mucronatum* C. A. M.

781

* From Greek *acantha*, spine, and *phyllon*, leaf, referring to the subulate-spinescent leaves of typical representatives of the genus.

- + Plant glabrous throughout; leaves 10–15 mm long, minutely mucronulate; flower-heads 4–9 mm in diameter; calyx 3 mm long 19. *A. microcephalum* Boiss.
8. Ovules 8–10 9.
- + Ovules 4 12.
9. Petals unequally toothed at apex, scarcely longer than calyx; calyx teeth subulate-acerose 21. *A. sordidum* Bge.
- + Petals entire, one and a half times as long as calyx; calyx teeth acute but not subulate-acerose 10.
10. Stems and leaves glabrous; leaves thin, acerose, 1–2 cm long; seeds dull 22. *A. knorringianum* Schischk.
- + Stems and leaves pubescent; seeds usually shining 11.
11. Leaves 2–3.5 cm long and 1–1.5 mm broad; flower-heads many-flowered, 1–2 cm in diameter; seeds shining 21. *A. glandulosum* Bge.
- + Leaves 1–2(2.5) cm long and 0.75 mm broad; flower-heads 0.7–1 cm in diameter 23. *A. schugnanicum* (Preobr.) Schischk.
12. Plant covered throughout with very short glandular hairs without a mixture of simple hairs; leaves to 6 cm long 9. *A. korshinskyi* Schischk.
- + Plant glabrous or covered with simple hairs sometimes interspersed with glandular 13.
13. Stems and leaves glabrous; calyx glabrous or scarcely pubescent 14.
- + Stems and leaves pubescent; calyx always more or less pubescent 17.
14. Calyx ca. 5 mm long; stems rather long; plants of shifting sands, usually not spherical-pulvinate; leaves more or less flat 15.
- + Calyx 7–9 mm long; stems 15–30 cm long; leaves subulate 16.
15. Leaves ovate-lanceolate, 5–10 mm broad 16. *A. elatius* Bge.
- + Leaves linear or lance-linear, 1–3 mm broad 17. *A. borsczowii* Litw.
16. Stems 10–15 cm long; leaves 2–3.5 cm long 5. *A. subglabrum* Schischk.
- + Stems 25–35 cm long; leaves 4–5 cm long 8. *A. turcomanicum* Schischk.
17. Leaves 7–12 mm long 18.
- + Leaves 1.5–8 cm long 19.
18. Calyx 5–6 mm long, covered with simple hairs; petals white 14. *A. acerosum* Sosn.
- + Calyx 9–10 mm long, glandular-pubescent; petals dark red 15. *A. pulchrum* Schischk.
19. Petals lilac; leaves obliquely ascending 3. *A. lilacinum* Schischk.
- + Petals white, pink or reddish; leaves horizontally spreading 20.
20. Bracts erect, exceeding calyx and corolla 13. *A. aculeatum* Schischk.
- + Bracts recurved, shorter than calyx 21.
21. Calyx 8–9 mm long, densely covered with simple as well as glandular hairs 22.

- + Calyx covered with simple hairs, 6–7 mm long (very rarely to 9 mm long) 23.
22. Stems 35–40 cm long; bracts much shorter than calyx 11. *A. krascheninnikovii* Schischk.
- + Stems 10–20 cm long; bracts nearly equal to calyx 10. *A. adenophorum* Freyn.
23. Leaves 4–8 cm long, usually 1 mm broad 24.
- + Leaves 1.5–4 cm long and mostly 1.5 mm broad 25.
24. Calyx 7–9 mm long; flower-heads loose; leaves pubescent; amnophilous plants 7. *A. stenostegium* Freyn.
- + Calyx 6–7 mm long; flower-heads compact; leaves glabrous 6. *A. tenuifolium* Schischk.
25. Axillary fascicles very short; flower-heads ca. 1.5 cm in diameter; petals white 4. *A. albidum* Schischk.
- + Axillary fascicles well developed; flower-heads 2–4 cm in diameter; petals commonly pink or reddish 26.
26. Plants densely crisp-pubescent; petal-limb elliptic-linear, 1–1.5 mm broad, acute 27.
- + Plants less densely pubescent; petal-limb ovate, 2–2.5 mm broad, obtuse 2. *A. pungens* (Bge.) Boiss.
27. Calyx 7.5–8.5 mm long; leaves 0.5–1 mm broad. (Centr. Asia) 12. *A. brevibracteatum* Lipsky.
- + Calyx 6–7 mm long; leaves 1–1.5 mm broad (Caucasus) 1. *A. squarrosus* Boiss.
- 783 28 (1). Calyx 3–5.5 mm long; petals slightly exceeding or one and a half times as long as calyx 29.
- + Calyx cylindric, 7–10 mm long; petals pink, twice as long as calyx 31.
29. Petals linear-oblong, as long as calyx; calyx teeth narrowly triangular-lanceolate, long-acuminate; pedicels 1–2 mm long 33. *A. tadshikistanicum* Schischk.
- + Petals obovate-oblong, one and a half times as long as calyx; calyx teeth broadly triangular, obtusish 30.
30. Flowers in compact 3-flowered dichasia at tips of branches, the lateral flowers of each dichasium borne on pedicels 0.5–1.5 mm long; calyx 4 mm long, scabrid-puberulent like the whole plant 31. *A. paniculatum* Rgl.
- + Flowers in loose 3-flowered dichasia at tips of branches, the lateral flowers of each dichasium borne on slender pedicels 5–10 mm long; calyx 3 mm long, usually glabrous like the whole plant 32. *A. gypsophiloides* Rgl.
31. Herbaceous plants, covered with simple crisp hairs; stems 1–15 cm long (Centr. Asia) 30. *A. transhyrcanum* Preobr.
- + Undershrubs, covered with patulous glandular hairs; stems 15–40 cm long (S. Transcaucasia) 32.
32. Calyx-teeth narrowly lanceolate, subulate-acuminate, 2–3 mm long; calyx covered with rather short patulous hairs 29. *A. bungei* (Boiss.) Trautv.
- + Calyx-teeth triangular or triangular-lanceolate, acute, 1–1.5 mm long; calyx densely covered with long patulous hairs 28. *A. versicolor* Fisch. et Mey.

Subgenus 1. **EUACANTOPHYLLUM** (Boiss.) Schischk. — Sect. *Eua cantho -*
phyllum Boiss. Fl. Or. I (1867) 561. — Flowers in dense corymbose-capitate
or spherical inflorescences; leaves subulate-acerose, rarely muticous;
stamens 4–10; bracts herbaceous, rigid, subulate-acerose; ovules 4.

Section 1. **OLIGOSPERMA** Schischk. — Flowers in rather loose corymbose
or spherical terminal heads; calyx 5–9 mm long; bracts subulate-acerose;
ovules 4.

Series 1. **Squarrosa** Schischk. — Bracts recurved; plants covered with
simple hairs; leaves 1.5–4 cm long.

1. *A. squarrosus* Boiss. Diagn. ser. II, 1 (1855) 81; Fl. Or. I, 562; Gorssg.,
Fl. Kavk. II, 425. — *A. pungens* var. *squarrosus* Golenk. in A. H. P. XII
(1893) 83. — Exs.: Th. Kotschy, Pl. Pers. austr. no. 440.

784 A much branched undershrub, 10–30 cm high, densely crisp-pubescent;
leaves subulate-acerose, 1.5–4 cm long and 1–1.5 mm broad, spreading,
sometimes arched-recurved, flat above, convex beneath; inflorescence a
terminal corymb consisting of several to many heads 1.5–2 cm in diameter;
flowers on very short pedicels, almost sessile; bracts reflexed at tips,
7 mm long; calyx cylindric, 6–7 mm long, densely crisp-pubescent; teeth
erect, short-lanceolate, acerose; petals white or pink, one and a half times
as long as calyx; limb elliptic-linear, 1.2 mm broad, acutish. June–July.

Solonetz deserts and stony slopes. — Caucasus: S. Transc. (Hakhichevan,
Dzhulfa, Orubad, Karabag). Gen. distr.: Iran and Beludzhistan. Described
from S. Iran and Beludzhistan. Type in Geneva; cotype in Leningrad.

2. *A. pungens* (Bge.) Boiss. Fl. Or. I (1867) 561; Kryl., Fl. Zap. Sib. V,
1095. — *Saponaria pungens* Bge. in Ldb. Icon. pl. Fl. Ross. I (1829),
tab. 4 et in Ldb. Fl. Alt. II (1830) 133. — *Acanthophyllum spinosum*
C. A. M. Verzeichn. Pfl. Cauc. (1831) 210; Ldb. Fl. Ross. I, 333, non *Dianthus*
spinosus Desf. in Ann. Mus. Paris I (1802) 198, tab. 16, fig. 1. — Ic.: Ldb.
Ic., l. c., tab. 4.

Perennial; taproot 3–15 mm thick, vertical, multicipital; stems several,
divaricately branched from base, forming a subspherical bush, 15–35 cm
long, short-hairy; leaves horizontally spreading, subulate-spinose, 2–4 cm
long and 1–1.5 mm broad; axillary branchlets reduced to fascicles
of smaller subulate leaves; flowers at tips of stems and branches in
corymbose-capitate inflorescences 2–5 cm in diameter; bracts leaflike,
reflexed at tips, acerose; calyx tubular, 6–7 mm long and 1.5–2 mm broad,
puberulent; teeth broadly triangular, subulate-acerose, ca. 1 mm long;
petals reddish-pink, one and a half times as long as calyx; stamens nearly
twice as long as calyx. May–June. (Plate XLIX, Figure 3).

Stony slopes and sands. — Centr. Asia: Balkh., Dzu.-Tarb., T. Sh. Gen.
distr.: N. W. Mong. Described from the sands along the Irtysh River near
Lake Zaisan (N.). Type in Leningrad.

Note. Up till now this has been an aggregate species and we are
breaking it up into a number of distinct species.



PLATE XLIX. 1. *Acanthophyllum elongatum* (Preobr.) Schischk. — 2. *A. adenophorum* Freyn. — 3. *A. pungens* (Bge.) Boiss. — 4. *A. glandulosum* Bge. — 5. *A. elatius* Bge. — 6. *A. borsczowii* Litw. — 7. *A. korshinskyi* Schischk. — 8. *A. serawschanicum* Golenk. — 9. *A. stenostegium* Freyn. — 10, 11. *A. sordidum* Bge.: flowers, branches. — 12. *A. microcephalum* Boiss. — 13. *A. mucronatum* C.A.M.

3. *A. lilacinum* Schischk. in Addenda V, p. 680.

787 Perennial, woody and profusely branched at base; forming a spherical bush 20–25 cm high; herbaceous stems somewhat flexuous, branched only in inflorescence, scabrid-puberulent, faintly violet-tinged; leaves subulate, 2.0–3.5 cm long and 1.2 mm broad, slightly convex above, concave beneath, acerose, scabrid-pubescent, obliquely ascending; axillary fascicles very short; flowers in heads 1–2.5 cm in diameter, forming a rather compact corymbose inflorescence; bracts subulate-pointed from ovate or narrow-ovate base, crisp-pubescent on the back, usually recurved; calyx cylindric, ca. 7 mm long, violet-tinged at summit; teeth lance-subulate, acerose, 1.5–2 mm long; petals lilac, one and a half times as long as calyx; limb lance-ovate, ca. 1.5 mm broad, acute. July.

Gravelly slopes at altitudes of about 1,400 m. — Centr. Asia: Mt. Turkm. (Kopet Dag Range, environs of Sulyuklyu village). Endemic. Described from the location indicated. Type in Leningrad.

4. *A. albidum* Schischk. in Addenda V, p. 681.

Perennial, strongly woody and branched at base; stems ascending or erect, 15–32 cm long, grayish throughout from dense cover of short hairs; leaves subulate, 2–4 cm long and ca. 1.5 mm broad, puberulent or glabrate, horizontally spreading, acerose; sterile axillary shoots very short; flowers at the end of stems in heads 1–5 cm in diameter forming a rather broad corymbose inflorescence; calyx tubular, 6–7 mm long, covered with short crisp hairs; teeth subulate, ca. 1 mm long; petal-limb white, faintly pink at base, 1.5 mm broad, obtuse. May.

Conglomerate slopes. — Centr. Asia: Syr. D. (Kokand and Margel rivers). Endemic. Described from Kosh-Karchi (Margel River). Type in Leningrad.

5. *A. subglabrum* Schischk. in Addenda V, p. 681. — *A. stocksianum* β pubescens Freyn in Bull. Herb. Boiss. 2 sér. III (1903) 868.

788 Perennial, woody and branched at base; herbaceous stems numerous, 10–15 cm long, glabrous or sometimes very slightly scaberulous; leaves subulate-acerose, 2–3.5 cm long and 1.5 mm broad, horizontally spreading, glabrate, the margin ciliate; flowers in heads 1–3 cm in diameter at ends of stems and branches; calyx tubular, 7 mm long, glabrate or sparsely covered with short thickish hairs; teeth lance-subulate, acerose; bracts acuminate from narrow-ovate base, squarrose from the middle, scabrid-pubescent on the back; petals rose-lilac; limb narrow-ovate, ca. 1.5 mm broad, acute to obtusish. June–August.

Gravelly slopes at altitudes between 1,400 and 1,500 m. — Centr. Asia: Mtn. Turkm. (Kopet Dag Range, Kizyl-Arvat, Chuli, Suluklyu, Firyuza). Endemic. Described from environs of Chuli (Kopet Dag). Type in Leningrad.

Series 2. *Tenuifolia* Schischk. — Bracts squarrose; plants more or less pubescent; leaves 4–8 cm long.

6. *A. tenuifolium* Schischk. in Addenda V, p. 682.

Perennial, subspherically pulvinate; taproot 6–8 mm thick, obliquely ascending; stems numerous, ascending, 25–30 cm long, simple, minutely puberulent; leaves horizontally spreading, sometimes recurved, 4–5 cm long

and 1 mm broad, subulate-acerose, glabrous or obscurely scaberulous; axillary shoots reduced to fascicles, mostly half length of leaf, rarely exceeding the leaf; flowers at ends of stems in corymbose-capitate inflorescences 2–6 cm in diameter; bracts subulate-acerose from narrow-ovate base, puberulent on the back; ciliate-margined; calyx cylindrical, 6–7 mm long, 1–2 mm broad; teeth lanceolate, subulate-acuminate, subacerose, ca. 1 mm long; petals reddish-pink, one and a half times as long as calyx; limb narrow-ovate, ca. 1.5 mm broad, obtuse to acutish. June.

Dry places. — Centr. Asia: Syr D. (Fergana, Mailisai). Endemic. Described from the location indicated. Type in Leningrad.

7. *A. stenostegium* Freyn in Bull. Herb. Boiss. ser. 2, III (1895) 866.

Undershrub, 20–30 cm high; branches erect, bright green, slightly pubescent, the lower internodes 1.2 cm, the upper to 4 cm long; leaves horizontally spreading, subulate-acerose, 4–8 cm long and 1 mm thick, twice length of internodes, flat above, convex beneath; inflorescence terminal, loosely corymbose; bracts leaflike, horizontally spreading, acerose, the lower longer, the upper shorter than calyx; calyx tubular, 7–9 mm long, pubescent; teeth 5, one-third as long as calyx, subulate-acerose; petals reddish-pink, one and a half times as long as calyx; stamens nearly twice length of calyx. May–June. (Plate XLIX, Figure 9).

Hummocky sands and sandy slopes. — Centr. Asia: Kara K., Mtn. Turkm. Endemic. Described from Ashkhabad district and between Appazhu and Gyaurs. Type in Vienna; cotype in Geneva.

8. *A. turcomanicum* Schischk. in Addenda V, p. 682.

789

Perennial, glabrous throughout, except for the sometimes ciliate leaves and bracts, woody and profusely branched at base, 25–35 cm high; herbaceous stems whitish; leaves subulate, 3.5–5 cm long and 1.5 mm broad, acerose, concave above, convex beneath, with axillary fascicles; flowers in corymbose-capitate inflorescences at ends of stems and branches; bracts lanceolate, subulate-acuminate, acerose; squarrose, ciliate-margined, about equal to calyx; calyx cylindric, 8–9 mm long, puberulent or subglabrous; petals rose-lilac, one and a half times as long as calyx; limb narrow-ovate, ca. 1.5 mm broad, acute. May–June.

Gravelly slopes. — Centr. Asia: Mtn. Turkm. (Kopet Dag: Vannovka, Chuli). Endemic. Described from the village of Vannovka. Type in Leningrad.

Series 3. *Adenophora* Schischk. — Bracts squarrose; plants covered with simple as well as glandular hairs or glandular only.

9. *A. korshinskyi* Schischk. in Trav. Mus. bot. Ac. Sc. URSS, XXIV (1932) 39. — Ic.: l. c.

Undershrub; stems branched from base, 25–35 cm long, glandular-hairy as are the leaves and inflorescence; branches ascending or erect, simple; leaves horizontally spreading, subulate-acerose, the middle cauline 5–6 cm long and 2 mm broad at base, flat above, convex beneath, twice to five times the length of the internodes; inflorescence terminal, compactly corymbose, 2.5–5 cm across; involucre leaves 1–2.5 cm long, in lower part 3 mm broad; bracts more or less squarrose from about the middle, sometimes subpatulously so; calyx cylindric, 7–8 mm long, finely glandular-pubescent; teeth attenuate to a point, subacerose, one-third the length of the calyx;

petals light rose, about twice as long as the calyx; limb oblong, acute or acutish; stamens considerably exceeding petals. May–June. (Plate XLIX, Figure 7).

Sandy hills. — Centr. Asia: Mtn. Turkm. (Kushka River and Takhta Bazar). Endemic. Described from the environs of Kushka. Type in Leningrad.

10. *A. adenophorum* Freyn in Bull. Herb. Boiss. ser. 2, III (1895) 867.

Undershrub, covered with glandular as well as simple hairs; stems 10–20 cm long, branched, densely leafy; leaves subulate, subhorizontally spreading, 2.5–4 cm long, ca. 2 mm broad below, twice as long as internodes, flat above, convex beneath, fasciculiferous; flowers in corymbose-capitate terminal inflorescences 2–4 cm in diameter; bracts lance-triangular from ovate base, not squarrose, densely long-hairy as well as glandular beneath, about equal to calyx; calyx cylindric, 8–9 mm long, pubescent; teeth triangular-lanceolate, subulate-acerose, one-third the length of the calyx; petals dark rose, one and a half times as long as calyx; stamens nearly twice the length of the calyx. May. (Plate XLIX, Figure 2).

Clayey hills. — Centr. Asia: Mtn. Turkm. Endemic. Described from Ashkhabad district, Kyzyl-Arvat and Kara-Kala. Type in Vienna.

11. *A. krascheninnikovii* Schischk. in Addenda, V, p. 682.

Perennial, very woody and branched at base; stems numerous, 35–40 cm long, covered, as are the leaves, with short patulous hairs; leaves subulate, 1.5–3 cm long and 1–1.2 mm broad, horizontally spreading, acerose; flower-heads ca. 1.5 cm in diameter; bracts linear-subulate, reclinate, acerose, much shorter than calyx, densely covered with rather long crisp implexed and sometimes glandular hairs; calyx cylindric, 9 mm long, crisp-pubescent; teeth subulate-acerose, ca. 1 mm long; petals pink, violet-nerved; limb ovate, to 2 mm broad, acutish. June.

Gravelly slopes. — Centr. Asia: Kyz. K. Endemic. Described from Sultan-Uizdag. Type in Leningrad.

12. *A. brevibracteatum* Lipsky in Mém. Soc. Nat. Kiew. XI, 2 (1891) 6.

Undershrub, much branched, 18–20 cm high; stems and leaves scabrid-puberulent, the pubescence intermixed with short glandular hairs; leaves subulate-acerose, 12–22 mm long and 0.5–1 mm broad, subhorizontally spreading, triquetrous, convex beneath; inflorescence densely corymbose, consisting of several to numerous corymbiform heads ca. 2.5 cm in diameter; flowers subsessile; bracts linear-subulate, leaflike, slightly recurved from the middle, equal to or slightly shorter or longer than calyx; calyx cylindric, 7.5–8.5 mm long, crisp-puberulent; teeth subulate-acerose, ca. 2 mm long; petals light or dark pink, one and a half times as long as calyx; limb narrow-ovate, 1.5 mm broad, acute; ovary 4-ovuled. June.

Stony, often gypseous slopes. — Centr. Asia: Mtn. Turkm., Pam.-Al. Endemic. Described from Kyzyl-Arvat. Type in Leningrad.

Series 4. *Aculeata* Schischk. — Bracts erect or slightly recurved, exceeding or shorter than calyx; leaves 0.7–2.5 cm long.

13. *A. aculeatum* Schischk. in Addenda, V, p. 683.

Perennial; stems branched from base, ascending, 10–15 cm long, scabrid-pubescent; leaves horizontally spreading, subulate, 1.5–2.5 cm long and ca. 1 mm broad, scabrid-pubescent, acerose; axillary shoots nonelongated, reduced to fascicle of short subulate leaves; flowers in hemispherical head 2.5–3.5 cm in diameter; bracts subulate, acerose, erect or slightly recurved, exceeding the flowers, crisp-pubescent on the declivity of the dilated base, broadly scarious-margined, ciliate, calyx tubular, 9 mm long, puberulent; teeth lance-subulate, ca. 2 mm long; petals whitish-rose; limb narrow-ovate, ca. 1 mm broad, acute. June.

Dry hills, at altitudes of about 360 m. — Centr. Asia: Syr D. (environs of Dzhizak). Endemic. Described from the location indicated. Type in Leningrad.

14. *A. acerosum* Sosn. in Mon. du Jard. bot. de Tiflis, livr. 36 (1915) 7.

Undershrub, branched from base, densely cespitose; herbaceous stems densely puberulent, 8–15 cm long, slightly thickened at nodes, simple or short-branched at summit; leaves subulate, acerose, 7–10 mm long, spreading, glabrate, fasciculiferous; flowers in terminal and axillary heads 0.7–1.5 cm in diameter, sessile or short-pedicel; bracts puberulent, surpassing the flower-head, acerose, scarious-margined at the triangular base; calyx 5–6 mm long, puberulent; teeth lanceolate, scarious-margined, ciliate, tapering to a rather long subulate point, one-third length of calyx; petals white, linear, one and a half times as long as calyx, emarginate. July.

Stony slopes. — Occurring at Turkish borders between Olor and Norpet villages (former Oltu district). Endemic. Described from the location indicated. Type in Tbilisi.

15. *A. pulchrum* Schischk. in Izv. Tadzhihist. Bazy Akad. Nauk I, 1 (1933)

76. — Ic.: op. cit.

Undershrub, 15–20 cm high, branched from base; branches procumbent or ascending in lower part, covered, as are the leaves, with short thickish often glandular hairs; leaves opposite, linear-subulate, 9–12 mm long and 0.5–0.7 mm broad; leaves of axillary fascicles shorter; flowers at tips of branches in compact corymbose-capitate inflorescences; calyx 9–10 mm long, glandular-pubescent, sessile, enveloped at base by a pair of leaflike ascending acerose bracts; petals dark rosy-red or reddish-lilac, two and a half times as long as calyx; limb lance-ovate, acutish, gradually attenuate to a long claw; ovary 4-ovuled. June.

792

Conglomerate taluses at altitudes of about 1,600 m. — Centr. Asia: Pam.-Al. Endemic. Described from Tadzhikistan. (Kostrosh). Type in Leningrad.

. Series 5. *Elatiora* Schischk. — Calyx 5–6 mm long; plants glabrous or nearly so; stems long.

16. *A. elatius* Bge. ex Boiss. Fl. Or. I (1867) 561; Golenkin in A. H. P. XIII, 83; Litw. in Trav. Mus. bot. III, 98. — *A. spinosum* Bge. in Pl. Lehman. 227, non C. A. M. — *A. recurvum* Rgl. in A. H. P. IX (1886) 606. — *A. latifolium* Lipsky in Mém. Soc. Nat. Kiev XI, 2 (1891) 6. — Exs.: HFR no. 1854.

Perennial; stems woody below; branches 60–100 cm long, glabrous, thickened at nodes; branches brittle; leaves lanceolate, 1.5–2 cm long and 3–6 mm broad, glaucescent, coriaceous, glabrous, rugose, acerose, one-third to half the length of internodes, the thick midrib prominent beneath; inflorescence terminal, corymbose, rather compact; bracts linear-lanceolate to linear, acerose, equal to calyx, spreading or recurved; calyx tubulate, slightly pubescent below the teeth, 5–6 mm long and 1–1.5 mm broad; teeth lanceolate, subulate-acerose, one-third length of calyx; petals rose-lilac, one and a half times as long as calyx; limb lanceolate, acutish. May–June. (Plate XLIX, Figure 5).

Sandy deserts, scrub, and Haloxylon woods. — Centr. Asia: Kara K., Kyz. K. (?). **Gen. distr.:** N. Iran. Described from Iran (Khorosan Pass between Messin and Mehran) and from Kara-Kum (Turkmenia). Type in Geneva; cotype in Leningrad.

17. *A. borsczowii* Litw. in Trav. Mus. Bot. Acad. Pétersb. III (1907), nom. nud. descr. op. cit. VII (1910) 71. — *A. pungens* β *glabriusculum* Rgl. in A. H. P. V (1877) 248.

Undershrub, branched from base, slightly pubescent or subglabrous; stems whitish, 20–40 cm long; leaves subulate, ca. 0.5–1.5 cm long, horizontally spreading, acerose, 1–3 mm broad at the flattish base; leaves of axillary fascicles shorter and narrower; flowers at ends of branches in rather loose corymbose-capitate inflorescences 2–3 cm in diameter; calyx cylindric, 5–6 mm long, sparsely covered with short simple hairs; teeth triangular, scarious-margined, acerose; subtending bracts paired, ascending or deflexed, acerose, shorter than and sometimes not more than half as long as calyx; petals pink, about twice as long as calyx; limb lance-ovate, acutish, gradually narrowing to a long petiole; ovary 4-ovuled. June. (Plate XLIX, Figure 6).

793

Sands. — Centr. Asia: Ar.-Casp., Kyz. K., Syr D., Balkh. Endemic. Described from lower reaches of the Syr Darya River. Type in Leningrad.

Section 2. **TURBINARIA** Boiss. Fl. Or. I (1867) 563. — Flowers small, in compact axillary and terminal heads; bracts lanceolate, acerose; ovary 4-ovuled; leaves 7–15 mm long.

18. *A. mucronatum* C. A. M. Verzeichn. Pfl. cauc. (1831) 210; Ldb. Fl. Ross. I, 334; Boiss. Fl. Or. I, 563; Grossg., Fl. Kavk. II, 426.

Perennial, scabrid-puberulent throughout; stem many branched, forming a spherical bush 25–50 cm high; leaves linear, 7–12 mm long and 1 mm broad, terminating in a rather long subulate point, puberulent or sometimes subglabrous; axillary shoots reduced to a leafy fascicle; flower-heads compact, ca. 10 mm in diameter; bracts herbaceous, linear, subulate-pointed, with ciliolate margin, ca. 5 mm long; calyx 4 mm long; teeth acerose, one-quarter to one-third as long as calyx; petals white, one and a half times as long as calyx. June–August. (Plate XLIX, Figure 13).

Stony slopes. — Caucasus: S. Transc., Tal. **Gen. distr.:** N. Iran. Described from Talysh (Zuvant). Type in Leningrad.

19. *A. microcephalum* Boiss. Diagn. ser. I, 1 (1842) 43; Fl. Or. I (1867) 564; Golenk. in A. H. P. XIII (1893) 85.

Perennial, woody at base; stems herbaceous, whitish, glabrous, branched at summit, 10–30 cm long; leaves linear, 1–1.5 cm and 1 mm broad, channeled above, convex beneath, short-acerose, glabrous, with short axillary fascicles; flowers in compact heads 4–9 mm in diameter, at tips of branches; bracts linear-lanceolate, subulate-pointed, equaling calyx; calyx conic, ca. 3 mm long, finely scabrid or subglabrous; teeth acerose, one-quarter to one-third as long as calyx; petals one and a half times as long as calyx; limb white, emarginate. May–July. (Plate XLIX, Figure 12).

Stony and dry slopes. — Centr. Asia: Mtn. Turkm. **Gen. distr.:** N. Iran. Described from N. Iran. Type in Geneva.

Section 3. **PLEIOSPERMA** Boiss. Fl. Or. I (1867) 565. — Flowers in corymbose terminal heads; bracts ovate or oblong, acerose, narrowly scarious-margined; ovary 8–10-ovuled.

20. **A. sordidum** Bge. ex Boiss. Fl. Or. I (1867) 565. — **A. viscidum** Freyn in Bull. Herb. Boiss. sér. 2, III (1903) 869. — **A. spinidens** Freyn in Bull. Herb. Boiss. sér. 2, III (1903) 870.

794 Undershrub, profusely branched at base; branches simple, stramineous, 8–15 cm long, with internodes 1–1.75 cm long; leaves subulate-acerose, the lower 1.2–2 cm long and 1.2–2.5 mm broad, channeled above, convex beneath, fasciculiferous, the upper shorter; flowers in dense terminal glandular-pubescent sessile heads 1–1.8 cm in diameter; bracts linear-lanceolate, densely glandular-pubescent, very slightly shorter than calyx; calyx cylindric, 6–7 mm long, somewhat enlarged at summit and 2 mm broad below the teeth, these stramineous, acerose, one-quarter to one-third the length of calyx; ovary 8–10-ovuled. June–July. (Plate XLIX, Figures 10, 11).

Stony slopes. — Centr. Asia: Mtn. Turkm. (Firyuza, Kheirabad, Newtonovka). **Gen. distr.:** Iran. Described from Iran (Khorosan Province between Shakhrud and Nizarup). Type in Geneva; cotype in Leningrad.

21. **A. glandulosum** Bge. ex Boiss. Fl. Or. I (1867) 565.

Perennial, much branched, 10–20 cm high; herbaceous stems finely glandular-puberulent or with indument consisting of subpatulous glandular and simple hairs (var. *tomentellum* Freyn et Sint.); leaves spreading, subulate-acerose, 2–3.5 cm long and 0.1–1.5 mm broad, channeled above, convex beneath, finely glandular-pubescent, fasciculiferous; flowers in many-flowered terminal capitate inflorescences 10–20 mm in diameter; bracts oblong, navicular, scarious-margined, acerose, shorter than calyx; calyx oblong-cylindric, ca. 6–7 mm long, glandular-hairy; teeth acute but not acerose; petals white or rose (var. *roseum* Bornm.), oblong-spatulate, obtusish, one and a half times as long as calyx; ovary 10-ovuled; seeds rounded-reniform, ca. 2 mm in diameter, finely striate, shining. May–July. (Plate XLIX, Figure 4).

Stony slopes. — Centr. Asia: Mtn. Turkm., Pam.-Al. **Gen. distr.:** N. Iran. Described from Iran (Elburz Range; Shakhrud). Type in Leningrad.

Economic importance. The roots of this plant are gathered in considerable quantity in Turkmenia. They are known as "soap root" and are used as a soap substitute.

22. *A. knorringianum* Schischk. in Acta Inst. Botan. Ac. Sc. URSS, ser. 1, III (1936).

Undershrub, much branched, ca. 15 cm high, glabrous; leaves spreading, acerose, thin, 1–2 cm long and 0.5 mm broad, very slightly channeled above, convex beneath, glabrous; axillary fascicles very short and inconspicuous; flowers subsessile, in terminal capitate inflorescences ca. 1 cm in diameter; bracts subulate-acerose from ovate base, thin, glandular-pubescent, scarious-margined below, shorter than calyx; calyx oblong-cylindric, 6 mm long, glandular-pubescent; teeth terminating in a slender point but not subulate-acerose; petals lurid, slightly exceeding to one and a half times as long as calyx, oblong-spatulate, obtusish; capsule oblong, equaling or scarcely exceeding calyx; seeds oblong, 2 mm long and 1.2 mm broad, finely striate, dull. June – July.

Stony steppes. – Centr. Asia: Pam.-Al. (Chiya village, between Ak-Tau and Bakhil-Tau mountains). Endemic. Described from the location indicated. Type in Leningrad.

23. *A. schugnanicum* (Preobr.) Schischk. sp. nova in Addenda V, p. 683. – *A. fontanesii* subsp. *schugnanicum* Preobr. in sched. ad Herb. Ac. Sc. URSS.

Undershrub, much branched from base, 8–15 cm high; herbaceous stems scabrid-pubescent as are the leaves; leaves subhorizontally spreading, subulate-acerose, 1–2.5 cm long and 0.75 mm broad, channeled above, convex beneath; axillary fascicles very short; flowers in terminal 5–7-flowered capitate inflorescences 0.7–1 cm in diameter; bracts ovate-lanceolate, acuminate or briefly subulate-tipped, scabrid-pubescent, scarious-margined below, about half length of calyx; calyx oblong-cylindric, densely short-hairy; teeth lanceolate, acuminate; petals whitish-rose, one and a half times as long as calyx, oblong-spatulate, obtuse or rounded at apex. July – August.

Stony slopes. – Centr. Asia: Pam.-Al. (Shugnan) Seidzh River valley (Shobek-Dara River). Endemic. Described from the Seidzh River valley. Type in Leningrad.

Section 4. **MACROSTEGIA** Boiss. Fl. Or. I (1867) 563. – Flowers in terminal and axillary heads; bracts ovate, broadly scarious, nonacicular; ovary 4-ovuled.

24. *A. korolkowii* Rgl. et Schm. in A. H. P. V, 1 (1877) 249; Golenkin in A. H. P. XIII, 84. – *A. alexandrae* Smirn. ex Rgl. in A. H. P. V, 1 (1877) 250 nom. nud.

Perennial, woody at base; stems glandular-pubescent, commonly whitish, branched above, 20–80 cm long; leaves linear-lanceolate, 2.5–4 cm long and 0.5–1 cm broad, rounded at apex, muticous, 1-veined, scabrid-pubescent; flowers in loose short-peduncled heads surrounded by an involucre;

involucral leaves scarious, oval-orbicular, 3–6 mm in diameter, puberulent; bracts similar; calyx cylindric, 5–6 mm long and 1.5–2 mm broad, scabrid-pubescent; teeth short, rounded; petals whitish, one and a half times as long as calyx. May–June. (Plate L, Figure 7).

Hummocky sands. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K. Endemic. Described from the shore of Sardeba-Kul Lake between Khalat and Amu Darya. Type in Leningrad.

25. *A. elongatum* Preobr. sp. nova in Addenda V, p. 683. — *A. bracteatum* Boiss. subsp. *elongatum* Preobr. in sched.

Perennial, glabrous and glaucous throughout; stems 35–45 cm long, slender, ca. 1 mm in diameter; leaves subulate-acerose, triquetrous, flat above, convex beneath, the lower 3–3.5 cm long and near base 1–1.5 mm broad, the median and upper smaller, fasciculiferous; flowers in compact terminal heads 12–15 mm in diameter; involucral leaves and bracts obovate, 7–8 mm long and 4 mm broad, reddish-purple along the back, prominently keeled, broadly scarious-margined, mucronulate; calyx tubular, 7.5–8.5 mm long and 1.5–2 mm broad, slightly pubescent, reddish-purple in upper part; teeth obtuse, softly mucronulate; petals purplish-rose, scarcely longer than calyx, emarginate. July. (Plate XLIX, Figure 1).

Centr. Asia: Mtn. Turkm. (Firyuza Pass). Endemic. Described from the location indicated. Type in Leningrad.

26. *A. serawschanicum* Golenk. in A. H. P. XIII, 1 (1893) 85.

Undershrub, much branched; branches puberulent, thickened at nodes, 10–20 cm long; leaves spreading, subulate-acerose, flat above, convex beneath, 1.5–2.5 cm long and 0.5–2 mm broad, equaling or exceeding internodes, puberulent or glabrate, fasciculiferous; upper leaves shorter; flowers in densely 5–10-flowered terminal heads; involucral leaves scarious, mucronulate from obtuse apex; bracts oval, acuminate, shorter than calyx, densely pubescent; calyx campanulate, 4–5 mm long; teeth acuminate, muticous, scarious-margined, one-quarter length of calyx; petals rose-purple, sometimes almost white, one and a half times as long as calyx. July. (Plate XLIX, Figure 8).

Stony slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Zeravshan (between Varsaminor and Peti, Dark, Takfon).

27. *A. coloratum* (Preobr.) Schischk. in Acta Inst. Botan. Ac. Sc. URSS. Ser. I, III (1936). — *A. serawschanicum* f. *coloratum* Preobr. in sched. ad Herb. Acad. Sc. URSS.

Perennial, woody at base, branched; stems 10–15 cm long, puberulent; leaves linear, 1–1.7 cm long and 1–1.5 mm broad, acute but nonacerose, revolute-margined, scabrid-pubescent; flower-heads at tips of branches, compact, subspherical, ca. 1 cm in diameter; bracts broad-ovate, 4 mm long and 2 mm broad, short-acuminate, scarious, puberulent; flowers sessile; calyx campanulate, ca. 5 mm long, violet-tinged, puberulent; teeth broadly triangular, short-acuminate; petals linear-cuneate, in upper part 1 mm broad, obtuse, whitish-pink, with often violet-tinged midrib, one and a half times as long as calyx; ovary short-stipitate. August.



PLATE L. 1. *A. versicolor* Fisch. et Mey. — 2. *A. bungei* (Boiss.) Trautv. — 3. *A. tadshikistanicum* Schischk. — 4. *A. gypsophiloides* Rgl. — 5. *A. transhyrcanum* Preobr. — 6. *A. paniculatum* Rgl. — 7. *A. korolkowii* Rgl.

Stony slopes. — Centr. Asia: Pam.-Al. (Oshskaya River near the Aburan-Bel Pass). Endemic. Described from the location indicated. Type in Leningrad.

Subgenus 2. **ALLOCHRUSA** (Bge.) Schischk. — Gen. *Allochrusa* Bge. in Boiss. Fl. Or. I (1867) 559. — Leaves usually nonacerose; flowers in a paniculate or corymbose inflorescence; ovary 4- or 5-ovuled; stamens mostly included.

Section 1. **VERSICOLORIA** Schischk. — Inflorescence a corymb or few-flowered panicle; calyx tubular, 7–10 mm long; petals large, twice to three times as long as calyx.

28. **A. versicolor** Fisch. et Mey. in Ind. IV Hort. Petrop. (1838) 31; Ldb. Fl. Ross. I, 334; Golenk. in A. H. P. XIII, 87. — *Allochrusa versicolor* Boiss. Fl. Or. I (1867) 559; Grossg., Fl. Kavk. II, 426.

Perennial, densely glandular-pubescent throughout; stem 15–25 cm long, branched in inflorescence; leaves linear, 10–15 mm long and 1–2 mm broad, tapering toward base, obtusish at apex; inflorescence paniculate; bracts lanceolate, herbaceous, densely glandular-pubescent; pedicels as long as or longer than calyx; calyx cylindric, 7–9 mm long; teeth triangular-lanceolate, acute, 1–1.5 mm long, one-fifth to one-quarter as long as calyx; petals pink, twice to three times as long as calyx; limb obovate, large, scarcely emarginate; capsule slightly exceeding calyx. June–July. (Plate L, Figure 1).

Stony desert slopes. — Caucasus: S. Transc. (Hakhichevan River). **Gen. distr.:** Arm.-Kurd., Iran. Described from Nakhichevan district. Type in Leningrad.

800

29. **A. bungei** (Boiss.) Trautv. in A. H. P. II, 2 (1873) 511; Rgl. in A. H. P. V, 1 (1877) 248. — *Allochrusa bungei* Boiss. Fl. Or. I (1867) 560; Grossg., Fl. Kavk. II, 426. — **Exs.:** Pl. or. exs. no. 257 (sub *Allochrusa versicolore*).

Undershrub, much branched, 30–40 cm high, with upright branches, the woody parts with dark gray bark, the juvenile glandular-pubescent; leaves elliptic-linear or ovate-lanceolate, 1–2 cm long and 2–4 cm broad, rarely 5.6–6 mm broad (var. *latifolia* Trautv.), acute, long-petioled, glandular-puberulent, sometimes subglabrous, with axillary fascicles; pedicels slender, glandular-pubescent, 2–7 mm long; bracts linear-lanceolate, 1–3 mm long, acute, scarious or herbaceous; calyx tubular, slightly attenuate at summit, 7–10 mm long and ca. 1.5 mm broad, covered with usually rather short soft patulous hairs; teeth narrowly lance-subulate, muticous, 2–3 mm long, one-third as long as calyx; petals pink, one and a half times to twice as long as calyx; limb broad-obovate, sometimes emarginate. End of June and July. (Plate L, Figure 2).

Stony slopes. — Caucasus: S. Transc. (Sardar-Abad, Dzhulfa). **Gen. distr.:** Iran (N.), Arm.-Kurd. (Akh-Chai, Kulp). Described from N. Iran, between Maradan and Dzhulfa. Type in Geneva.

30. *A. transhyrcanum* Preobr. in Not. Syst. Herb. Petrop. I, 3 (1920) 1.

Perennial, much branched from base, with woody rootstock; stem 8–15 cm long, covered, as are the leaves, with short crisp hairs; leaves linear-lanceolate to linear, acute, 1–2 cm long and 1–1.5 mm broad; flowers in a dense corymbose terminal inflorescence; pedicels 4 mm long; calyx cylindric, puberulent, slightly attenuate at summit, 8–9 mm long and 2–2.5 mm broad; teeth triangular, acutish, ciliate, ca. 1 mm long; petals pink, twice as long as calyx. May. (Plate L, Figure 5).

Stony steppes and dry slopes. — Centr. Asia: Mtn. Turkm. (Dzhebel, Molla-Kara). Endemic. Described from the vicinity of the Dzhebel railway station. Type in Leningrad.

Section 2. **PANICULATA** Golenk. in A. H. P. XIII, 1 (1893) 87. — Flowers in a loose paniculate inflorescence; calyx tubular-conic, 3–5 mm long; petals slightly longer or one and a half times longer than calyx.

31. *A. paniculatum* Rgl. in Bull. Soc. Nat. Mosc. XXXIX, I (1866) 539; in A. H. P. V, 1 (1877) 249. — Ic.: Rgl., l. c. (1866) tab. II, f. 1–2.

301 Perennial; stems erect, much branched, 20–50 cm long, terete, thickened at nodes, minutely scabrid-puberulous as are the leaves; leaves linear-subulate, with thick midrib and 2 less distinct lateral veins, 1–3 cm long and 1–3 mm broad, acute, scarcely acerose, with axillary fascicles; flowers in few-flowered dichasia at ends of stems and branches, forming a paniculate inflorescence; pedicels stoutish, scabrid pubescent, 0.5–1.5 mm long; bracts linear-subulate, ca. 1.5 mm long, borne just below the calyx and appressed to it; calyx tubular-conic, ca. 4 mm long, densely scabrid-pubescent; teeth broadly triangular, short-acuminate, one-quarter the length of the calyx; petals white, one and a half times as long as calyx; limb obovate-oblong, rounded at apex; capsule obovoid, ca. 2 mm long. July–August. (Plate L, Figure 6).

Steppe-mountain slopes and among crops. — Centr. Asia: Dzu.-Tarb. (Dzungarian Ala-Tau), T. Sh., Pam.-Al. (E.). Endemic. Described from Dzhungarian Ala-Tau (picket Sary-Bulak). Type in Leningrad.

32. *A. gypsophiloides* Rgl. in A. H. P. V, 1 (1877) 249; Rgl. et Schmalh. Pl. nov. Fedtschenkoanae (1882) 15. — *A. paniculatum* β *gypsophiloides* Golenk. in A. H. P. XIII (1893) 87.

Perennial; rhizome long, to 7 mm thick; stems erect, divaricately branched from base, 50–80 cm long, glabrous, whitish or purple-tinged, strongly thickened at nodes, the branches arising at an almost right angle; leaves linear-subulate, glabrous or very rarely somewhat scabrid, with thick midrib and 2 less distinct lateral veins, 1–2 cm long and 0.5–0.3 mm broad, acute, scarcely acerose; leaves of axillary fascicles shorter and narrower; flowers in loose dichasia at ends of stems and branches, forming a broad panicle; central flower of the dichasium sessile, the other two on filiform pedicels 5–10 mm long; bracts lanceolate, ca. 0.5 mm long, inserted just below the calyx and appressed to it; calyx narrowly campanulate, 3 mm long, glabrous, often violet-tinged; teeth broadly triangular, narrowly white-margined, obtusish, one-quarter length of calyx; petals white or roseate,

one and a half times as long as calyx; limb obovate-oblong, rounded at apex. June—August. (Plate L, Figure 4).

Dry slopes, desert steppes, dry stream beds, and derelict fields. — Centr. Asia: W. T. Sh. (Kirghiz Range), Syr D., Amu D., Mtn. Turkm. (Kugitang), Pam.-Al. Endemic. Described from Kara-Tau Range. Type in Leningrad.

33. *A. tadshikistanicum* Schischk. in Trav. Musée Bot. Ac. Sc. URSS XXI (1932) 40. — *Allochrusa tadshikistanica* Schischk., l. c. —

802 Ic.: l. c., fig. 7.

Perennial; stem branched from base or from the middle, 20–50 cm long, purple-tinged and minutely scabrid-puberulent in lower part; leaves linear, 1-veined, acute, sessile, glabrous, scarcely ciliate at base; flowers in 3-flowered dichasia at ends of branches; pedicels puberulent, 1–2 mm long; bracts lance-linear, 1–2 mm long, acute, membranous-margined; calyx narrowly campanulate, 4.5–5.5 mm long and 1.5 mm broad, prominently 5-nerved, the membranous interspaces short-hairy; teeth narrowly lanceolate, long-acuminate, muticous, one-third length of calyx; petals white, linear-oblong, obtuse, about as long as calyx; ovary 4-ovuled. June. (Plate L, Figure 3).

Stony mountain slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Kyzyl-Su riverlet. Type in Leningrad.

Genus 497. **VACCARIA** * **MEDIC.** **

Medic. Phil. Bot. I (1789) 96.

Flowers large, in a loose corymbose inflorescence; calyx ovaloid-pyramidal, slightly inflated below, 5-angled; petals ecoronate, emarginate or entire, with a long linear claw; stamens 10; styles 2; capsule dehiscing apically by 4 teeth. Glabrous annuals, with erect stem; leaves lanceolate or ovate, subacute.

1. *V. segetalis* (Neck.) Garcke in Aschers. Fl. Prov. Brandenb. I (1864) 84; Shishkin in Fl. Yugo-Vost. IV, 302; Kryl., Fl. Zap. Sib. V, 1096. — *Saponaria segetalis* Neck. Delic. Gallo-Belg. I (1768) 194. — *S. vaccaria* L. Sp. pl. (1753) 409. — *Vaccaria pyramidata* Medic. Phil. bot. I (1789) 96. — *V. parviflora* Moench, Meth. (1794) 63; Shmal'g., Fl. I, 133. — *V. vulgaris* Host, Fl. austr. I (1897) 518; Ldb. Fl. Ross. I, 302, 303. — Ic.: Hegi, Ill. Fl. Mittel-Eur. III (1909) tab. 101, f. 5; Sorn. rast. SSSR, II (1934) 269, f. 159. — Exs.: Fl. exs. Reipubl. Bohem.-Slovenic. no. 23; Pl. Hercogov. exs. no. 27.

Perennial, smooth, glaucescent; stem erect, much branched above, 30–70 cm long; leaves ovate-lanceolate to ovate, acute, opposite, slightly connate at base, 2–9 cm long and 5–40 mm broad, mostly 3-veined, sessile; pedicels 1–6 cm long; calyx pale green or yellowish, 13–15 mm long and 5–9 mm broad, with 5 green winged ribs; teeth acute, with white scarious margin; petals pink, one and a half times as long as calyx; limb obovate, dentate; capsule ovaloid, 4-loculed at base; seeds globose, minutely tuberculate. May—August. (Plate LV, Figure 8).

* From Latin *vacca*, cow, possibly due to the fact that the plant provides good fodder for cows.

** Treatment by S. G. Gorshkova.

Meadows, glades; as weed in fields and young fallows. — European part: Kar.-Lap., Lad.-Ilm., U. V., V.-Kama, U. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., W., E., and S. Transc.; W. Siberia: U. Tob., Irt., Alt.; Far East: Uss.; Centr. Asia: Ar.-Casp., Balkh. Kara K., Mtn. Turkm., Amu D., Syr D., Pam.-Al., T.S. **Gen. distr.:** Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran., Ind.-Him., Mong., Jap.-Chi., N. Am. (introduced), Austr. (New Zealand) (introduced). Described from Europe. Type in London.

Economic importance. The weed infests only spring crops, especially millet. It also occurs wodely in flax fields of the South. The seeds are toxic.

Genus 498. **DIANTHUS** * L.

L. Sp. pl. (1753) 409.

Calyx tubular, cylindric or oblong, with 5 acute or acuminate or very rarely obtuse teeth and numerous nerves not anastomosing, subtended by 1-4 pairs of awned or acute scales [epicalyx]; petals long-clawed; limb horizontally spreading, pink purple, whitish or yellowish-green, dentate (rarely entire) or laciniate; stamens 10; styles 2; capsule oblong, sessile or borne on a short carpophore, unilocular, dehiscent by 4 teeth; seeds numerous, commonly black, discoid, sometimes subrotund, elliptic or oblong, borne on a central placenta. Annual or perennial herbs, very rarely undershrubs, with linear or lance-linear leaves.

1. Flowers short-pedicel, in dense terminal heads or in dense clusters 2.
- + Flowers distinctly pedicellate, solitary or in loose clusters, rarely 2 or 3 together 16.
2. Annuals or biennials 3.
- + Perennials 4.
3. Stems and leaves soft-hairy; calyx 15-18 mm long, soft-hairy in upper part; epicalyx scales green, herbaceous, gradually dilated toward base; petals red 1. **D. armeria** L.
- + Stem scaberulous; calyx 12-15 mm long, glabrous or scaberulous; epicalyx scales coriaceous, abruptly dilated toward base 2. **D. pseudoarmeria** M. B.
4. Uppermost leaf pair strongly dilated at base, with inflated sheath . . . 5.
- + Uppermost leaf pair not dilated at base; sheath not inflated 7.
5. Calyx 10-15 mm long, strongly attenuate at summit, with short lanceolate teeth; epicalyx scales abruptly narrowed to a short point, half length of calyx; petal-limb dark pink, subglabrous 4. **D. andrzejowskianus** (Zapal.) Kulcz.
- + Calyx 16-29 mm long, slightly attenuate at summit, with long lance-subulate teeth; epicalyx scales gradually or abruptly narrowed to a long awn reaching the summit of the calyx; petal-limb purple, bearded 6.
6. Epicalyx scales gradually narrowed to a point; leaf sheaths 12-20 mm long; plant glaucescent (Crimea and Ciscaucasia). . . 3. **D. capitatus** Balb.

* From Greek *Dis* [should be *Dios*], Zeus, the principal deity (Jupiter of the Romans), and *anthos*, flower. Name coined by Linnaeus because of the beautiful flowers of the garden carnation.

- 805
- + Epicalyx scales abruptly pointed; leaf sheaths 8–12 mm long; plant green (Transcaucasia) 5. *D. subulosus* Freyn et Conr.
 - 7. Leaves ovate-lanceolate to broad-lanceolate, short-petioled; plant cultivated or naturalized 15. *D. barbatus* L.
 - + Leaves linear or linear-lanceolate, sessile 8.
 - 8. Length of sheath equaling or not more than one and a half times leaf width 9.
 - + Length of sheath three to eight times leaf width 10.
 - 9. Epicalyx scales narrowly membranous-margined, abruptly narrowed to a usually herbaceous awn reaching two-thirds length of calyx; length of sheath equaling leaf width (S. Ukraine) 9. *D. eu-ponticus* Zapal.
 - + Plant 18–35 cm high; calyx 12–15 mm long, purple tinged at summit (Transcaucasia) 11. *D. transcaucasicus* Schischk.
 - 10. Calyx teeth ovate, obtuse 13. *D. polymorphus* M. B.
 - + Calyx teeth acute or acuminate 11.
 - 11. Calyx intensely purple-tinged; epicalyx scales mucronulate, one-third length of calyx, tuberculate-scabrous on the back above 12. *D. calocephalus* Boiss.
 - + Calyx greenish or slightly colored; epicalyx half as long as or equal to calyx, smooth on the back 12.
 - 12. Plant glaucous; flower-heads 2–6-flowered 14. *D. borbasii* Vand.
 - + Plant green; flower-heads commonly many-flowered 13.
 - 13. Calyx 10 mm long 7. *D. rogowiczii* Kleop.
 - + Calyx 15–18 mm long 14.
 - 14. Epicalyx scales gradually tapering to a point, with a broad thin scarious margin; petal-limb 7–10 mm long; leaves 2.5–6 mm broad; calyx teeth scabrid-pubescent outside at tips 8. *D. membranaceus* Borb.
 - + Epicalyx scales abruptly pointed, narrowly membranous-margined; petal-limb 4–5 mm long; leaves 1–2.5 mm broad; calyx teeth glabrous 15.
 - 15. Epicalyx scales covering half the calyx tube, the awns not reaching the base of calyx teeth (W. Ukraine) 6. *D. carthusianorum* L.
 - + Awns of epicalyx scales reaching calyx teeth and sometimes their tips (Gr. Caucasus) 10. *D. ruprechtii* Schischk.
 - 16. Petal-limb dentate or entire 17.
 - + Petal-limb dissected to below the middle or down to base, very rarely to but one-quarter or one-third its length, into linear or filiform segments 60.
 - 17. Annuals or biennials 18.
 - + Perennials, very rarely biennials 19.
 - 18. Calyx minutely tuberculate; leaves 2–4 mm broad 78. *D. cyri* Fisch. et Mey.
 - + Calyx smooth; leaves 5–15 mm broad (a cultivated plant) *17. *D. sinensis* L.
 - 19. Epicalyx scales 2 (in some flowers 4) 20.
 - + Epicalyx scales at least 4 22.
 - 20. Stems 10–40 cm long, puberulent, branched in upper part; cauline leaves 3–6 pairs 44. *D. deltoides* L.

- + Stems 5–8 cm long, glabrous, monanthous; cauline leaves 1 or 2 pairs 21.
21. Stems 10–18 cm long; cauline leaves 1–2 mm broad; epicalyx almost equal to calyx; petal-limb 10–15 mm broad 16. *D. repens* Willd.
- + Stems 5–12 cm long; cauline leaves 2.5–3 mm broad; epicalyx half length of calyx; petal-limb 6–10 mm broad 17. *D. raddeanus* Vierh.
- 806 22. Petal-limb hairless at base, whitish or pale pink, rarely of different color 23.
- + Petal-limb hairy at base, red or purple, rarely white 35.
23. Epicalyx scales broad-ovate or obovate-rhombic, minutely mucronulate, coriaceous, greenish-white, covering one-quarter to one-third of the calyx tube; petals whitish above, usually yellowish-green beneath 24.
- + Epicalyx scales ovate or ovate-lanceolate, awned, covering about half the calyx tube, the awns sometimes reaching the base of the teeth 31.
24. Calyx 9–10 mm long 51. *D. azkurensis* Sosn.
- + Calyx 12–35 mm long 25.
25. Epicalyx scales 4–6, obovate-rhombic, obtuse, slightly divergent, whitish, with a triangular green spot at summit 48. *D. andronakii* Woron.
- + Epicalyx scales 4, broad-ovate, abruptly narrowed to a short green mucro, closely appressed to calyx 26.
26. Calyx 12–16 mm long 27.
- + Calyx 17–30 mm long 28.
27. Lower part of plant commonly glabrous; petal-limb 4–5 mm long 49. *D. marschallii* Schischk.
- + Lower part of plant puberulent; petal-limb 5–10 mm long 50. *D. inamoenus* Schischk.
28. Petals red; calyx (5) 6–10 mm broad, subtended by a cluster of leafy bracts *56. *D. caryophyllus* D.
- + Petals whitish; calyx 3–6 mm broad, usually without a basal cluster of leafy bracts 29.
29. Calyx narrowly cylindric, 3–4 mm broad 46. *D. leptopetalus* Willd.
- + Calyx cylindric, 4–6 mm broad 30.
30. Stems 20–40 cm long, usually unbranched, monanthous or rarely 2- or 3-flowered; calyx 22–30 mm long 47. *D. schemachensis* Schischk.
- + Stems 40–60 cm long, usually branched, 2–5-flowered; calyx 17–22 mm long 45. *D. lanceolatus* Andrz.
31. Petals scarcely longer than calyx 52. *D. floribundus* Boiss.
- 807 + Petals one and a half times to twice as long as calyx 32.
32. Calyx 13–15 mm long, commonly reddish 54. *D. multicaulis* Boiss. et Huet.
- + Calyx 15–35 mm long, greenish 33.
33. Calyx 17–25 mm long; epicalyx scales 4 53. *D. petraeus* M. B.
- + Calyx 25–40 mm long; epicalyx scales 4–8 34.
34. Leaves 1 mm broad, rough-margined (N. Cauc.) 55. *D. fragrans* Adams.
- + Leaves 2–4 mm broad, smooth-margined (Talysh) 56. *D. talyschensis* Boiss. et Buhse.
- 35 (22). Much branched undershrubs, 10–30 cm high; leaves narrowly linear; calyx 10–12 mm long 36.

- + Taller plants, herbaceous or scarcely woody at base; calyx 12–30 mm long 37.
36. Epicalyx scales one-quarter length of calyx; petals white 38. *D. rigidus* M. B.
- + Epicalyx scales one-third length of calyx; petals pink above, yellowish-green beneath 39. *D. uralensis* Korsh.
37. Leaves 3–7 mm broad; calyx 3–5 mm broad; petals purple or dark pink 38.
- + Leaves 1–3 (4) mm broad; calyx 2–3.5 mm broad 49.
38. Epicalyx scales narrowly membranous-margined, abruptly subulate-tipped, equaling calyx tube; flowers subtended by linear-subulate foliaceous bracts 35. *D. eugeniae* Kleop.
- + Epicalyx scales without membranous margin, gradually tapering to a linear-lanceolate awn; inflorescence ebracteate 39.
39. Stems 5–20 cm long, mostly monanthous 40.
- + Stems 20–60 cm long, usually branched 41.
40. Leaves broadly lanceolate, 4–7 mm broad (Caucasus) 22. *D. kusnezovii* Marcov.
- + Leaves linear, to 1–2 mm broad (Centr. Asia) 20. *D. semenovii* (Rgl. et Herd.) Vierh.
41. Calyx 10–20 mm long 42.
- + Calyx 20–25 mm long 48.
42. Calyx commonly puberulous; epicalyx scales mostly 6 (Centr. Asia) 25. *D. turkestanicus* Preobr.
- 808 + Calyx glabrous; epicalyx scales usually 4, rarely 6 43.
43. Calyx 10–11 mm long; bracts and awns of epicalyx scales scabrid-pubescent (Caucasus) 27. *D. kubanensis* Schischk.
- + Calyx 12–18 mm long; bracts and calyx glabrous 44.
44. Outer epicalyx scales leaflike; usually equal to or exceeding calyx; leaf sheaths 0.5–1.5 mm long (S. W. Ukraine) 28. *D. guttatus* M. B.
- + Epicalyx scales subequal, usually reaching calyx teeth or one-third to half length of calyx tube; leaf sheaths 2–4 mm long 45.
45. Epicalyx scales 6, leaflike; leaves horizontally spreading 24. *D. amurensis* Jacq.
- + Epicalyx scales usually 4; leaves obliquely ascending 46.
46. Stems solitary or 2, 40–70 cm long; leaves 4–8 mm broad; flowers in a loose corymbiform panicle 19. *D. fischeri* Spreng.
- + Stems mostly numerous, 20–40 cm long; leaves 2–4 (5) mm broad; flowers solitary or several at tips of stems and branches 47.
47. Stems glabrous; leaves slightly scaberulous only on the margin near the sheaths, glabrous elsewhere; epicalyx scales usually terminating in a long subulate awn, this often reaching the base of calyx teeth 26. *D. pratensis* M. B.
- + Stems and leaves mostly scabrid-pubescent, especially in lower part; epicalyx scales mucronate 18. *D. versicolor* Fisch.
48. Stems 20–40 cm long; flowers solitary at ends of stems and branches 21. *D. discolor* Smith.
- + Stems 30–60 cm long; flowers short-pedicel in few-flowered 1-sided clusters at ends of stems and branches 23. *D. imereticus* (Rupr.) Schischk.

49. Flowers in clusters at summit of the densely leafy stem; epicalyx scales 8 43. *D. grossheimii* Schischk.
+ Flowers solitary; epicalyx scales 4-6 50.
50. Calyx 18-30 mm long (Caucasus) 51.
+ Calyx 12-18 (20) mm long 53.
51. Stems numerous, simple, 1-flowered; leaves 3-9-veined; plant woody in lower part (W. Transcaucasia) . . . 42. *D. acantholimmonoides* Schischk.
+ Stems solitary or several, mostly branched, herbaceous 52.
52. Stems 30-65 cm long, branched only at the very summit; leaves 2.5-4 cm long 29. *D. bicolor* Ad.
+ Stems 15-30 cm long, branched almost from base; leaves 1.5-2.5 cm long 34. *D. preobrashenskii* Klok.
53. Stems 5-35 cm long; leaves filiform-subulate, 0.5-2 cm long and 0.5-1 mm broad (Crimea) 41. *D. humilis* Willd.
+ Stems 20-60 cm long; leaves linear or linear-lanceolate, 1-8 cm long and 1-5 mm broad 54.
54. Calyx 12-14 mm long; petal-limb 4-6 mm long 55.
+ Calyx 15-18 mm long; petal-limb 6-9 mm long 57.
55. Leaves 3-6 cm long; epicalyx scales subulate-pointed 56.
+ Leaves 2-3 cm long; epicalyx scales acute, muticous (W. Tien Shan) 40. *D. kirghizicus* Schischk.
56. Leaf sheaths 3-5 mm long (European part) 36. *D. pallidiflorus* Ser.
+ Leaf sheaths 1-2 mm long (Siberia and Centr. Asia) 37. *D. ramosissimus* Pall.
57. Leaves narrowly linear to subsetaceous, mostly appressed to stem 31. *D. carbonatus* Klok.
+ Leaves 1.5-3.5 mm broad, mostly divergent 58.
58. Plant 10-20 (25) cm high, with numerous nonelongated sterile shoots; epicalyx scales short 32. *D. hypanicus* Andrz.
+ Plant 25-70 cm high, without sterile shoots; epicalyx scales one-third to half length of calyx tube 59.
59. Leaves 1-2 mm broad (W. Altai and N. Centr. Asia) 33. *D. elatus* Ldb.
+ Leaves 2-3.5 mm broad (mostly European part of the USSR) 30. *D. campestris* M. B.
- 60 (16). Plant 25-60 cm high; stem stout, 3-5 mm thick; flowers in pairs or in 3's, rarely solitary; epicalyx scales tapering to a lance-subulate or recurved sharp-pointed cusp 57. *D. libanotis* Ldb.
+ Plant usually lower; stem rather slender; epicalyx scales appressed to calyx, not sharp-pointed 61.
61. Leaves lance-linear, 4-10 mm broad 62.
+ Leaves narrowly linear or filiform, 0.5-2.5 mm broad 64.
62. Calyx cylindric, 23-25 mm long and 3 mm broad, pale green; stem 3-10-flowered 77. *D. stenocalyx* (Trautv.) Juz.
+ Calyx oblong, 4-5 mm broad, commonly colored 63.
63. Calyx 15-20 (23) mm long 75. *D. superbus* L.
+ Calyx 23-25 mm long (Centr. Asia) 76. *D. hoeltzeri* Winkl.
64. Leaves 1-2 cm long, rigid, subulate-pointed, usually arched-recurved, the margin asperous-denticulate 60. *D. squarrosus* M. B.

- + Leaves 2–10 cm long, appressed to stem or divergent but not recurved, the margin smooth or scarcely roughened 65.
65. Flowers in 2's or 3's at tips of branches, on very short pedicels; calyx 15–20 mm long; epicalyx scales 6–8, mucronate, covering one-third to half length of calyx tube 66. *D. seravschanicus* Schischk.
- + Flowers solitary at tips of stems or branches; epicalyx scales covering one-quarter to one-third, rarely half length of calyx tube 67.
66. Calyx 13–15 mm long; stems divaricately long-branched above. 67. *D. karataviensis* Pavl.
- + Calyx 15–40 mm long; stems simple, 1-flowered or with few short upright branches 67.
67. Plants with numerous sterile shoots consisting of linear or acicular leaves; petals large, white or rarely pink, dissected to one-third or beyond into linear segments 0.33–1 mm broad (European part and W. Siberia) 68.
- + Plants not densely caespitose, with few sterile shoots or none; petals red, pink or lurid, usually dissected to below the middle into slender filiform segments or else petals short, unequally dissected (Caucasus and Centr. Asia) 69.
68. Calyx 18–20 (23) mm long; leaves of sterile shoots linear, 1–2 mm broad. 58. *D. arenarius* L.
- + Calyx 20–25 mm long; leaves of sterile shoots acicular, 0.3–1 mm broad. 59. *D. acicularis* Fisch.
69. Epicalyx scales acute (very rarely obtusish) or short-acuminate but not distinctly subulate-pointed 70.
- + Epicalyx scales terminating in a rather long point. 76.
70. Epicalyx scales 4; calyx commonly 25–35 mm long, rarely to 20 mm long; petal-limb dissected to the middle or nearly to base 71.
- + Epicalyx scales 6–8, rarely 4; calyx 18–25 mm long; petal-limb dissected to one-quarter or one-third 74.
71. Stems glabrous, glaucescent; undissected portion of petal-limb mostly large, obovate 70. *D. tetralepis* Nevski.
- + Stems puberulent at least in lower part or, if glabrous, then petal-limb laciniate nearly to base. 72.
- 811 72. Petals whitish, exceeding calyx by only one-quarter (S. Transcaucasia) 72. *D. canescens* C. Koch.
- + Petals pink or purplish-red, one and a half times to twice as long as calyx (Centr. Asia) 73.
73. Stems sparingly puberulent, woody at base; leaves linear, 1–2 mm broad; petal-limb laciniate-multifid to below the middle, the undissected portion of the limb ca. 7 mm long and 2–3 mm broad (Mtn. Turkmenia) 69. *D. turcomanicus* Schischk.
- + Stems scabrous or naked, not woody at base; leaves narrowly linear, 0.5–1 mm broad; petal-limb dissected nearly to base 68. *D. soongoricus* Schischk.
74. Epicalyx scales and sometimes calyx teeth obtusish; epicalyx covering one-third of calyx; petals large, the undissected portion of the limb 8–10 mm long and 4–5 mm broad (Artvin) . . . 63. *D. recognitus* Schischk.
- + Epicalyx scales and calyx teeth acute; epicalyx covering one-third to half the length of calyx; undissected portion of petal-limb rather small, narrow-ovate 75.

75. Petal-limb laciniate-multifid; epicalyx covering more than half of calyx tube (Centr. Asia) 72. *D. macronyx* Fenzl.
+ Petal-limb fringed with few unequal divisions; epicalyx covering one-third to half the length of calyx (Transcaucasia) 71. *D. orientalis* Adams.
76. Calyx 15–20 mm long 77.
+ Calyx 25–40 mm long 78.
77. Petals about equal to calyx tube, the limb laciniate-multifid nearly to base (Tien Shan) 65. *D. tianschanicus* Schischk.
+ Plant strongly lignified in lower part, almost suffrutescent; petals short, the limb to 5 mm long, toothed to one-third (S. Transc.) 73. *D. tabrisianus* Bien.
78. Stems 5–18 cm long; calyx 35–40 cm long; awns of epicalyx scales reaching the summit of calyx (S. Transc.) . . . 62. *D. crossopetalus* Fenzl.
+ Stems 20–40 cm long; calyx 25–35 mm long; awns of epicalyx scales reaching the middle of the calyx tube, very rarely the base of calyx teeth 79.
79. Stems woody at base; petals white, rarely pink; petal-limb fringed to below the middle (Transc.) 61. *D. crinitus* Sm.
+ Stems herbaceous; petals reddish or pale pink; petal-limb fringed nearly to base (Centr. Asia) 64. *D. kuschakewiczii* Rgl. et Schmalh.

812

Subgenus 1. **ARMERIASTRUM** Ser. in DC. Prodr. I (1824) 355. — *Carthusianastrum* F. N. Williams in Journ. of Bot. XXIII (1885) 340; in Journ. Linn. Soc. XXIX (1893). — Flowers in compact clusters or heads, usually bracteate; petals always toothed at summit; carpophore very short. Annuals or perennials.

Section 1. **ARMERIUM** Williams, l. c. (1885) 340. — Annuals or biennials; epicalyx scales herbaceous; leaves sessile.

1. *D. armeria* L. Sp. pl. I (1753) 410; Ldb. Fl. Ross. I, 274; Boiss. Fl. Or. I, 508; Shmal'g., Fl. I, 124; Shishkin in Fl. Yugo-Vost. IV, 304; Grossg., Fl. Kavk. II, 431. — *D. villosus* Gilib. Fl. lithuan. II, 1 (1781) 160. — *Caryophyllus armerius* Moench, Meth. (1794) 59. — *Diosanthus armerium* St.-Lag. in Ann. Soc. Bot. Lyon VII (1880) 124. — Ic.: Rchb. Ic. Fl. Germ. VI, tab. 249; Fedch. and Fler., Fl. Evrop. Ross. II, 905.

Annual or biennial; stems usually several, 10–45 cm long, erect or at base ascending, simple or branched, glabrate below, densely puberulent above; lower leaves oblong-lanceolate, 2–5 cm long and 1–3 mm broad, pubescent, sessile, connate at base into a sheath, its length about equaling leaf width; flowers sessile or short-pedicelled, in 2–10-flowered heads at ends of stems and branches; calyx cylindric, 17–20 mm long, covered with short soft hairs; teeth lance-subulate; epicalyx scales herbaceous, subulate-acuminate from ovate-lanceolate base, equaling or exceeding calyx; petal-limb oblong, 4–5 mm long, rose-purple with darker spots, hairy on upper surface, toothed at summit; capsule shorter than calyx. July–August. (Plate LI, Figure 2).

Open woods and coppices. — European part: U. Dnp., M. Dnp., Bl., L. Don, Crim.; Caucasus: Cisc., Dag., E., W., and S. (N. part) Transc. **Gen. distr.:** Scand., Centr. Eur. Described from Gotland. Type in London.

2. *D. pseudoarmeria* M. B. Fl. taur.-cauc. I (1808) 323; III, 297; Ldb. Fl. Ross. I, 275; Boiss. Fl. Or. I, 508; Shmal'g., Fl. I, 124; Grossg., Fl. Kavk. II, 431. — Ic.: M. B. Cent. Pl. Rar. II, t. 70; Rchb. Pl. crit. VI, t. 540.

813 Annual or biennial; stems erect, 15–50 cm long, simple or branched, sparingly scabrid-pubescent; basal leaves marcescent; cauline leaves linear, 1.5–5 cm long and 1–3 mm broad (in var. *robustum* Schischk. 6–8 cm long and 4–6 mm broad); obliquely ascending, acute, 1–3-veined, scabrous; length of sheath equaling leaf width; flowers usually numerous rarely 5–10, in a compact head at end of stem; calyx cylindric, 13–15 mm long, very sparingly scabrous; teeth lance-linear, terminating in a soft point; epicalyx scales 4, coriaceous, ovate, abruptly terminating in a herbaceous subulate awn reaching the summit of calyx, finally patulous; petal-limb pink, broad-ovate or oblong, hairy on upper surface, deeply toothed. June–August. (Plate LI, Figure 3).

Turfy and stony slopes, and rocks. — European part: Bl., L. Don, Crim.; Caucasus: Cisc., Dag., E. Transc. (Gori, Tbilisi). **Gen. distr.:** Bulgaria, Yugoslavia. Described from Crimea. Type in Leningrad.

Section 2. **CARTHUSIANI** Boiss. Fl. Or. I (1867) 481. — *Carthusianum* Williams in Journ. of Bot. XXIII (1885) 341. — Perennials; epicalyx scales coriaceous, very rarely herbaceous.

Series 1. **Capitati** Schischk. — Sheath of uppermost leaf pair inflated; cauline leaves sessile.

3. *D. capitatus* Balbisi in DC. Cat. Hort. Monsp. (1813) 24, 103; Ldb. Fl. Ross. I, 276, part.; Boiss. Fl. Or. I, 514; Shmal'g., Fl. I, 126, pp.; Gro Grossg. Fl. Kavk. II, 434. — *D. atrorubens* M. B. Fl. taur.-cauc. I, 324, non All. — *D. capitatus* ssp. *eucapitatus* Kleop. in Bull. Jard. Bot. de Kieff XI (1929) II, nom. nudum. — Ic.: Rchb. Ic. Fl. Germ. VI, tab. 249, fig. 5015.

Perennial; stem subterete, glaucescent, glabrous, 20–50 cm long (in var. *minor* Boiss. 10–20 cm); leaves linear, 5–11-veined, 5–7 mm long and 2–5 mm broad, somewhat roughened on the margin, the sheath 12–20 mm long; uppermost pair of cauline leaves dilated at base, with more or less inflated sheath; inflorescence a compact head; involucral bracts several pairs, coriaceous, broad-ovate at base, abruptly narrowed to a subulate point, this usually reaching top of capitulum; calyx 16–19 mm long, somewhat attenuate and purple-tinged at summit, lanceolate teeth ca. 5 mm long; epicalyx scales ovate, gradually passing into awn, this usually reaching calyx teeth; petal-limb purple, toothed, ca. 5 mm long, bearded above. June–July. (Plate LI, Figure 4).

Turfy and stony slopes. — European part: Crim., L. Don; Caucasus: Cisc., W. Transc. (Novorossiisk, Gelendzhik). **Gen. distr.:** Rumania, Yugoslavia. Described from live plant grown from seed obtained from Balbisi (from Crimea?).

4. *D. andrzejowskianus* (Zapal.) Kulcz. in Fl. Polska II (1921) 156; Kleop. in Bull. du Jard. Bot. de Kieff XII—XIII (1931) 18. — *D. capitatus* ssp. *Andrzejowskianus* Zapal. Consp. Fl. Gal. crit. III (1911) 133. — *D. capitatus* Schischk. in Fl. Yugo-Vost. IV, 306, non Balb.

Perennial; stem subterete, glaucescent, 40–60 cm long, simple, glabrous; leaves linear, 5–10 cm long and 1–3 mm broad, with naked margin; sheath 10–20 mm long; leaves of 2 uppermost pairs dilated at base and usually with dilated sheath; inflorescence a compact head; involucre bracts several pairs, strongly dilated in lower part, abruptly cuspidate; calyx 10–13 mm long (in subsp. *orientalis* Kleop. 13–16 mm), strongly attenuate at summit; teeth lanceolate, ca. 5 mm long; epicalyx scales abruptly mucronate, half the length of calyx tube; petal-limb dark rose, obsoletely bearded; seeds peltate, subrotund, 2–2.7 mm long and 1.75–2 mm broad. June–July. (Plate LI, Figure 6).

Steppes, turfy and stony slopes. — European part: U. Dnp., M. Dnp., Bl., L. Don, L. V., V.-Kama, Transv.; W. Siberia: U. Tob. **Gen. distr.:** Poland. Described from Galician Podolia. Type in Cracow.

5. *D. subulosus* Freyn et Conr. in Bull. Herb. Boiss. 2 sér. III (1895) 76; Grossg., Fl. Kavk. II, 434. — *D. capitatus rubescens* Owerin in Zap. Kavk. Obshch. Sel'sk. khoz. XX, no. 6 (1874) 245. — Exs.: Pl. orient. exs. no. 10.

Perennial; stems several, 40–75 cm long, simple, glabrous; leaves 6–10 cm long and 2–3.5 mm broad, linear, acuminate, scarcely roughened on the margin, connate at base into sheath 8–12 mm long; flowers in a terminal capitulum; involucre bracts sometimes greatly exceeding capitulum; calyx oblong-cylindric, 16–20 mm long, purple-tinged at summit; epicalyx scales coriaceous, ca. 10 mm long, sometimes violet-tinged at margins, glabrous on the back, abruptly subulate-awned, reaching calyx teeth; petals dark red, the limb hairy on the upper surface. June–August. (Plate LI, Figure 10).

Coppices, open woods, and mountain slopes. — Caucasus: E. and S. Transc. Endemic. Described from the environs of Akhtala (Georgia). Type in Vienna.

Series 2. *Carthusianoides* Williams in Journ. of Bot. XXIII (1885) 341. — Sheath of uppermost leaf pair not inflated; cauline leaves sessile.

*6. *D. carthusianorum* L. Sp. pl. I (1753) 409; Ldb. Fl. Ross. I, 275, part.; Shmal'g., Fl. I, 125. — *D. carthusianorum* ssp. *eu-carthusianorum* Hegi in Allg. Bot. Zeitschr. XVII (1911) 11. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 252. — Exs.: HFR no. 10.

Perennial; stems 30–50 cm long, simple, 4-angled, glabrous; leaves 5–12 cm long and 1–2 mm broad, linear, acute, asperous-margined, connate at base into sheath 9–12 mm long; capitulum commonly 6–14-flowered, involucre; calyx cylindric, 15–20 mm long, purple-tinged; epicalyx scales coriaceous, brown, broad-ovate or obovate, obtuse, abruptly subulate-awned, 3–6 mm long, half the length of the calyx tube; petal-limb pink or purplish-red, 6–12 mm long. June–July. (Plate LI, Figure 9).



PLATE LI. 1. *Dianthus membranaceus* Borb.— 2. *D. armeria* L.— 3. *D. pseudoarmeria* M.B.— 4. *D. capitatus* Balb.— 5. *D. borbasii* Vandas.— 6. *D. andrzejowskianus* (Zapal.) Kulcz.— 7. *D. polymorphus* M.B.— 8. *D. euponticus* Zapal.— 9. *D. carthusianorum* L.— 10. *D. subulosus* Conrath et Freyn.— 11. *D. colocephalus* Boiss.— inflorescence and epicalyx scales.

Dry meadows and pine woods. Not found in the USSR. Occurring in adjoining parts of Poland. **Gen. distr.:** Centr. Eur., W. Med., Bal. Described from Germany, Italy, and Sicily. Type in London.

7. *D. rogowiczii* Kleop. in Bull. du Jard. Bot. de Kieff XII—XIII (1931) 6.

Perennial; stem 30–60 cm long, simple, erect, 4-angled, glabrous; leaves 5–7 cm long and 2–4 mm broad, linear, acuminate, obscurely veined, asperous on the margin and the upper ones also on the underside, connate at base into sheath 10–18 mm long; capitulum (4) 10–20-flowered, hemispherical; involucre bracts coriaceous, brown or blackish-brown, ovate, emarginate, with awn length of the body, usually not overtopping the flower-head; epicalyx scales coriaceous, emarginate, awn reaching middle of calyx tube; calyx tubular, 10–11 mm long, suffused with dark purple; teeth triangular-lanceolate, short-acuminate, ciliate; petals dark purplish-red; limb 3–4 mm long, with dentate margin. June.

Woods and coppices. — European part: M. Dnp. Endemic. Described from Polonkoe, district of Berdichev, Makhnovka. Type in Kiev.

8. *D. membranaceus* Borb. in Oesterr. Bot. Zeitschr. XXVI (1876) 125; Fedch. and Fler., Fl. Europe. Ross. II, 406. — *D. carthusianorum* var. *glomeratus* Schmalh. Fl. Yugo-Zap. Ross. (1876) 77. — *D. sinensis* var. *collinus* Schmalh. Fl. I (1895) 125. — *D. glabriusculus* Kleopov in Bull. Jard. Bot. de Kieff IX (1929) 11, non Kit.

Perennial; stems 25–75 cm long, erect, rarely glaucescent, glabrous; leaves linear-lanceolate to linear, 5–8 cm long and 2.5–5.5 mm broad, asperous on the margin and on the veins beneath, acuminate, connate at base into sheath 5–12 mm long; flowers at ends of stems and branches in clusters forming a head; calyx cylindric, 15–18 mm long, green or faintly purplish-tinged; teeth ovate-lanceolate, short-acuminate, scabrous above, 3.5–5 mm long; epicalyx scales 4–6, coriaceous, pale stramineous-brown, elliptic, with membranous margin 2 mm broad, abruptly terminating in awn 1–3 mm long, covering half of calyx tube; petal limb purple, obovate, 7–10 mm long, bearded above, toothed at summit. June–August. (Plate LI, Figure 1).

Steppes, steppe slopes, open woods, and coppices. — European part: U. Dnp., M. Dnp., Bl. **Gen. distr.:** Poland, Bulgaria. Described from Elizavetgrad. Type in Budapest.

9. *D. eu-ponticus* Zapal. Consp. Fl. Galic. crit. III (1911) 141; Pachoskii, Opisan. rast. Khersonsk. gub. II Step1, 145; Kleopov in Visn. Kyivs'kogo Botanich. Sadu XII—XIV (1931–1932) 3. — *D. pseudobarbatus* Bess. ex Rchb. Fl. Germ. excurs. (1832) 805, nom. nud. — *D. corymbosus* Andrzej. in Ischisl. rastenii Podol'skoi gub. (1860) 18, non Sibth. (1823). — *D. liburnicus* Ldb. Fl. Ross. I, 277, non Bartl. — *D. trifasciculatus* Shmal'g., Fl. Yugo-Zap. Ross. 75, non Kit. — *D. sinensis* α *pseudobarbatus* Schmalh., Fl. I (1895) 125. — *D. collinus* auct. Fl. Ross. ex parte.

Perennial; stems 30–80 cm long, 3–4 mm thick about the middle, green, glabrous; basal leaves marcescent; cauline leaves 5–11 cm long and 8–10 mm broad, greatly exceeding internodes, linear-lanceolate, acuminate, 7-veined, scabrous in upper part, connate at base into sheath 5–10 mm long;

flowers in 3–8-flowered clusters forming a corymbose inflorescence; lower bracts herbaceous, slightly membranous-margined below, leaflike, the upper dilated below, oblong, 5–5.5 mm long and 2.5 mm broad, tapering to a subulate awn 4.5–5.5 mm long; calyx 17 mm long, purple-tinged at summit, with lance-subulate teeth; epicalyx scales 4, coriaceous, membranous-margined, 6.5–7.5 mm long and 3–4 mm broad, obtuse, abruptly passing into awn 3.5–7 mm long, more than two-thirds the length of calyx; petals purple; limb obovate-cuneate, 9–10 mm long and 7–8 mm broad, black-spotted and bearded at throat. July–August. (Plate LI, Figure 8).

Meadows, steppes, wood margins, groves, and coppices. — European part: U. Dnp., M. Dnp., Bl. **Gen. distr.:** Rumania. Described from Znamenka village near Aleksandriya). Type in Cracow.

10. **D. ruprechtii** Schischk. in Grossh. Fl. Kavk. II (1930) 433 et in Addenda V, p. 684. — *D. carthusianorum* β *caucasicus* Rupr. Fl. Cauc. (1869) 174.

819 Perennial; stem 20–50 cm long, simple, glabrous; basal leaves marcescent, linear, scarcely roughened on the margin, 2–2.5 cm long and 2.5 mm broad; cauline leaves 3–6 pairs, 7–10 cm long and 2–4 mm broad, linear, acute, with naked margins, 3–7-veined, appressed to stem; sheath 10 mm long, that of uppermost leaf pair not inflated; flowers in a compact 4–6-flowered terminal head, subtended by a pair of narrowly linear bracts, these not overtopping the head; calyx cylindric, 16–17 mm long, usually dark-colored in upper part, with acute teeth; epicalyx scales broad-ovate, 6–8 mm long, often retuse at apex or abruptly terminating in a mucro 1 mm long, one-third to half the length of calyx; petals red; limb suborbicular, 4–5 mm long, unequally dentate. July–August.

Subalpine meadows, at altitudes between 1,600 and 2,200 m. — Caucasus: Gr. Cauc., Dag. Endemic. Described from the Main Caucasian Range. Type in Tbilisi.

11. **D. transcaucasicus** Schischk. in Ber. d. Tomsk. Staats-Universität 80 (1929) 452; Grossg., Fl. Kavk. II, 433.

Perennial; stems several, 18–35 cm long, 0.5–1.5 mm thick, ascending at base, the lower part, like the leaves, puberulent or scabrous or glabrate; leaves linear, 3–5 cm long and 1.5–4 mm broad, 3–5-veined, scabrous or glabrous, the sheath 2–4 mm long; flowers in a rather compact 5–10-flowered head subtended by a pair of bracts, these equaling or shorter than the head; calyx cylindric, 12–15 mm long and 3 mm broad, purple-tinged at summit, the teeth lanceolate or ovate-lanceolate, acuminate; epicalyx scales 4, coriaceous, ovate, 5 mm long and 2.5 mm broad, often purple-tinged, abruptly terminating in awn 2–6 mm long, reaching the middle of the calyx tube or the base of the teeth; petal-limb oblong, 3–5 mm long, purple, unequally toothed, with rather long hairs on the upper surface. May–July.

Stony and argillaceous slopes and dry mountain slopes. — Caucasus: S. Transc. **Gen. distr.:** Arm.-Kurd. Described from Palanteken Range near Gasan-Kuly. Type in Leningrad.

12. **D. calocephalus** Boiss. Diagn. sér. I, VI (1845) 23; Fl. Or. I, 515; Grossg., Fl. Kavk. II, 433; Bornm. in Engl. Bot. Jahrb. LIX (1924) 400.

Perennial; stem 40–60 cm long, simple, glabrous, glaucescent; leaves 4–8 cm long and 1.5–2 mm broad, linear, long-acuminate, 3-veined; sheaths 10–12 mm long; flowers in a compact many-flowered terminal bracteate head; calyx oblong-cylindric, 16–18 mm long, purple-tinged, scarcely scabrid; epicalyx scales ovate-oblong, abruptly terminating in a slender awn, to 9 mm long including awn; petals lateritious; limb to 6 mm long, hairy above. June–August. (Plate LI, Figure 11).

Subalpine meadows, turfy and stony mountain slopes, open woods, and coppices. — Caucasus: E. and S. Transc. **Gen. distr.:** Arm.-Kurd., E. Med., Bal.-As. Min. Described from "Tmoli inter Bozdagh et Sardeo." Type in Geneva.

13. **D. polymorphus** M. B. Fl. taur.-cauc. I (1808) 324, III, 298; Boiss. Fl. Or. I, 511; Williams in Journ. Linn. Soc. XXIX (1893) 383, ex parte; Shishk. in Fl. Yugo-Vost. IV, 305; Kleop. in Bull. Jard. Bot. de Kieff, XII–XIII (1931) 15. — **D. polymorphus** var. α Ldb. Fl. Ross. I (1842) 276. — **D. polymorphus** α genuinus Schmalh., Fl. Yugo-Zap. Ross. (1886) 78; Fl. I, 126. — **D. polymorphus** ssp. *diutinus* f. *kitai-belianus* Tusz. et f. *tauricus* Tusz. in Bot. Közlemények XIII (1914) 8. — Ic.: Rchb.: Ic. Fl. Germ. VI, t. 251; Tusz., l. c., tab. I, f. A, tab. 2, f. D.

Perennial; stems commonly several, 30–50 cm long, simple, obtusely 4-angled, glabrous or in lower part scabrous; basal leaves narrowly linear, 2–5 cm long and 0.5–1.5 mm broad; cauline leaves linear, 4–6 cm long and 1.5 mm broad, often appressed to stem, the margin prominently asperous; sheaths 8–10 mm long; inflorescence a few-flowered head, subtended by a pair of bracts; calyx cylindric, 12–14 mm long (in subsp. *bessarabicus* Kleop. 19–21 mm), bluntly toothed; epicalyx scales coriaceous, ovate, gradually tapering to a short cusp, one-third to nearly half the length of calyx; petal-limb rose-red, 5–10 mm long, hairy above, short-toothed at apex. June–August. (Plate LI, Figure 7).

Dry steppes and sands. — European part: U. Dnp., Bl., Crim., L. Don, L. V.; Caucasus: Cisc. (Anapa district, Uryup River). **Gen. distr.:** Bessarabia (subsp. *bessarabicus* Kleop.). Described from the Caucasus and lower reaches of the Volga. Type in Leningrad.

Note. The Bieberstein Herbarium contains two different species under the name *D. polymorphus*. One of these species, with acute calyx teeth, is now known under the name *D. borbasii* Vand. Bieberstein's appellation *D. polymorphus* M. B. may be retained for the other species, with truncate calyx teeth.

14. **B. borbasii** Vand. in Oesterr. Bot. Zeitschr. XXXVI (1886) 193; Williams in Journ. Linn. Soc. XXIX (1893) 383; Shishk. in Fl. Yugo-Vost. IV, 305; Kryl., Fl. Zap. Sib. V, 1098. — **D. polymorphus** β *calycis dentibus acutis* Ldb. Fl. Ross. I (1842) 276. — **D. polymorphus** β *diutinus* Schmalh., Fl. I (1895) 126. — **D. carthusianorum** f. *borysthenica* Pacz. in Zap. Kievsk. Obshch. Estestv. (1893) 35. — **D. polymorphus** ssp. *diutinus* f. *orientalis* Tusz. in Bot. Közlemények XIII (1914) 8. — Ic.: Syreishch., Ill. Fl. Mosk. gub. II, 112; Tusz., l. c., t. 2, f. A. B. — Exs.: Fl. Polon. exs. no. 143.

Perennial; stems solitary or 2–4, erect, usually simple, scabrous in lower part, glabrous above, obtusely 4-angled, 25–70 cm long; basal leaves

narrowly linear, sometimes almost setaceous, ciliate; cauline leaves 4–6 pairs, narrowly linear, 3–7 cm long and 1.5–2 mm broad, 3-veined; length of sheath 3–6 times leaf width; flowers in a compact 2–8-flowered terminal cluster, very rarely solitary; calyx 13–15 mm long; teeth acuminate, reddish-brown, 4 mm long; epicalyx scales 4–6, whitish, subcoriaceous, obovate or elliptic, 6–8 mm long and 3–4 mm broad, with membranous margin ca. 1 mm broad, abruptly cuspidate or short-awned, usually covering half the calyx; petal-limb rose-red or purple, with toothed margin, hairy above. June–August. (Plate LI, Figure 5).

Pine woods, meadow steppes, sand dunes, and water meadows. — European part: U. Dnp., M. Dnp., Bl., U. V., V.-Kama, Transv., L. Don, L. V., Crim. (Kerch Strait), Caucasus: Cisc. (Taman Gulf between Stavropol and Krasnodar); W. Siberia: U. Tob.; Centr. Asia: Ar.-Casp. **Gen. distr.:** E. Poland. Described from Konstantinov District near Klevan.

Series 3. **Macrolepis** Williams in Journ. of Bot. XXIII (1885) 341. — Leaves lanceolate, petiolate; epicalyx scales herbaceous.

15. **D. barbatus** L. Sp. pl. (1753) 403; Ldb. Fl. Ross. I, 275; Shmal'g., Fl. I, 124; Kom., Fl. Manch. II, 207; Shishk. in Fl. Yugo-Vost. IV, 304; Grossg., Fl. Kavk. II, 432. — *Caryophyllus barbatus* Moench, Meth. (1794) 59. — Ic.: Rchb. Ic. Fl. Germ. tab. 248, f. 5013.

Perennial; stem 40–60 cm long, glabrous or scabrid-pubescent, glaucous, simple, terete to almost 4-angled (var. *quadrangulus* Bordz.); leaves lanceolate, acute, 4–7 cm long and 6–15 mm broad, 3–7-veined, glabrous or roughened on the margin, short-petioled, the sheath 2–5 mm long; pedicels very short; inflorescence a corymbose head; calyx cylindric, 16–18 mm long, with lanceolate long-acuminate teeth; epicalyx scales 4, herbaceous, 6–7 mm long, membranous-margined, ciliate, abruptly passing into a herbaceous scabrous awn to 10 mm long; petals various shades of red. July–August.

Cultivated as an ornamental garden plant; often naturalized in meadows, groves, parks, and gardens; occasionally occurring on stony slopes and on riverine sands. — European part: nearly all regions except Arctic and Kar.-Lap.; Caucasus: Cisc., W. Transc.; Far East: Uss. **Gen. distr.:** Centr. and Atl. Eur., W. Med., Bal. Apparently described by Linnaeus from cultivated specimens; provenience not indicated.

822

Economic importance. An ornamental plant, often cultivated in gardens.

Note. According to West European authorities (Hegi, Ascherson, and others), the plant grows wild in the mountains of Tyrol, Styria, and Carpathia. There are various horticultural forms differing in petal coloring, such as pure white (*albus*), dark violet (*atroviolaceus*), dark blood-red (*atrosanguineus*), blackish-red (*magnificus*), white-margined (*marginatus*), light-colored on the margin and light-spotted at center (*auriculiflorus*, *oculatus*), and dark-nerved (*striatus*). Some of the forms mentioned are the result of hybridization with the horticultural *D. sinensis* L.

Subgenus 2. **CARYOPHYLLUM** Ser. in DC. Prodr. I (1824) 357. — *Caryophyllastrum* Williams in Journ. of Bot. XXIII (1885) 342. — Flowers solitary or else 2 or 3 at tips of stems and branches; petals toothed or entire or laciniate; carpophore distinct. Perennials.

Section 1. **BARBULATUM** Williams in Journ. of Bot. XXIII (1885) 344; in Journ. Linn. Soc. XXIX (1893) 355, 412. — Petals more or less bearded, dentate, pink or purple, very rarely white. Perennials.

Subsection 1. **GLAUCI** Verh. in Sitzber. Acad. Wiss. Wien, Math.-Nat. Kl. CVII, 1 (1898) 1067. — Plants caespitose, usually without basal leaf rosette. Plants glaucescent, glabrous or scarcely scaberulous.

Series 1. **Repentes** Schischk. — Plants rather densely caespitose; stems rather short, usually monanthous; epicalyx scales 2–4.

16. **D. repens** Willd. Sp. pl. II (1799) 681; Ldb. Fl. Ross. I, 281; Vierh. in Sitzb. Acad. Wiss. Wien Math.-nat. Cl. CVII, 1 (1898) 1134; Kryl., Fl. Zap. Sib. V, 1105. — **D. dentosus** Fisch. ex Rchb. Pl. crit. VI (1828) 32. — **D. alpinus** γ **repens** Rgl. in Bull. Soc. Nat. Mosc. XXXIV, 4 (1861) 531; Robinson, Proc. Am. Ac. XXVIII (1893) 127. — **D. seguieri** var. **repens** Glehn in A. H. P. IV, 1 (1876) 25. — **D. sinensis** var. **repens** Trautv. in A. H. P. V, 1 (1877) 29. — **D. alpinus** Ldb. Fl. Ross. I, 281, non L. — Ic.: Seemann Bot. Voy. Herald I, tab. 4; Rchb., l. c., tab. 546 (743, 744).

23 Perennial; stems numerous, 7–20 cm long, simple, 1-flowered, glabrous; leaves linear, acuminate, 2–4 cm long and 1–2 mm broad, 1-veined, slightly attenuate toward base; calyx cylindric, 11–14 mm long and 4–5 mm broad, commonly purple-tinged; epicalyx scales 2, rarely 4, ovate, slenderly long-acuminate, about equal to or shorter than calyx; petals pink; limb broadly obtriangular, in upper part 9–12 (15) mm broad, crenulate at summit. July–August.

Meadows and sandy slopes in the arctic and alpine zones. — Arctic: Arc. Eur. (Bol'shezemel'skaya Tundra, Adzva River), Arc. Sib., Chuk., An.; European part: Ural (Denezhkin Kamen); E. Siberia: Lena-Kol. (Tungir River basin); Far East: Okh., Uda, Kamch. **Gen. distr.:** Arc. Am., Greenland. Described from Ural. Type in Berlin.

Note. This is the only species of *Dianthus* that grows wild in America.

17. **D. raddeanus** Vierh. in Sitzungsber. d. Kaiserl. Ac. Wissensch. in Wien. Mathem.-naturw. Classe, Bd. CVII, Heft VIII–X, Abth. I (1898) 1145 (89); Grossg., Fl. Kavk. II, 431. — **D. alpinus** var. **glacialis** Trautv. in A. H. P. II (1873) 505, non Rgl. — **D. trautvetteri** Woron. in Mitt. Kauk. Museums VII (1913) 337. — Ic.: Woron. op. c., tab. 1.

Perennial, tufted; rootstock woody, giving rise to flowering stems and nonelongated sterile shoots with linear-lanceolate leaves about the length of stem; stems 5–13 cm long, erect, smooth or sometimes scabrous; cauline leaves 1 or 2 pairs, linear, acute or subacute, 1.5–4 cm long and 2.5–3 mm broad, 3-veined, asperous-margined, connate at membranous base; flowers solitary on stem; calyx tubular, 10–17 mm long and 4–5 mm broad, often purple-tinged; teeth acute, scabrous-margined, 4 mm long; epicalyx scales 2, inserted at some distance from calyx base, ovate, ca. 10 mm long and 4 mm broad, purple-tinged at broadly membranous margin, greenish on back, abruptly terminating in a short scabrous cusp;

petal-limb 8–12 mm long and 6–10 mm broad, bearded at base, purple above, yellowish beneath, pectinate-toothed at summit. July–August.

Alpine, often calcareous rocks and meadows, at altitudes between 1,800 and 3,200 m. — Caucasus: E., W. and S. Transc. Endemic. Described from Gezel-Dara mountain. Type in Vienna; cotype in Leningrad.

Series 2. **Versicolores** Schischk. — Calyx somewhat enlarged at the middle, 4–5 mm broad; epicalyx scales 4–6, more than half length of calyx or reaching calyx teeth. Herbaceous plants.

*17. **D. chinensis** L. Sp. pl. (1753) 411; Rohrb. in Linnaea XXXVI (1870) 670; Hemsl. in Journ. Linn. Soc. XXIII (1886) 63; Williams ibidem XXIX (1893) 429, ex parte. — Ic.: Bot. Mag. tab. 25 et 5536; Fl. des serres tab. 1150, 1283, 1288, 1380, 1381.

824 Annual or biennial, glabrous throughout; stem erect or ascending, 30–50 cm long, branched above; leaves linear-lanceolate to lanceolate, acuminate, 6–15 mm broad, sparingly ciliate, short-petioled; flowers in groups of several at tips of stems and branches; calyx oblong-cylindric, 15–20 mm long; epicalyx scales tapering from broad base to a long linear awn, about half length of to equaling calyx tube; petal-limb broadly obovate, toothed at summit, various shades of pink, rarely white, dark-spotted, slightly bearded, yellowish on the underside; anthers blue.

Not growing wild in the Soviet Union, but often cultivated in gardens. Native in E. China.

18. **D. versicolor** Fisch. in Link, Enum. I (1821) 420; DC. Prodr. I, 358; Williams in Journ. Linn. Soc. XXIX (1893) 424; Shishk. in Fl. Yugo-Vost. IV, 309; Kryl., Fl. Zap. Sib. V, 1103. — **D. seguieri** Ldb. Fl. Ross. I, 277, ex parte, non Vil. — **D. sinensis** auct. plur. Fl. Ross., non L. — Ic.: Rchb. Ic. Bot. exot. (1824) tab. 48.

Perennial; taproot stout, giving rise to several or numerous stems; stems ascending at base, 20–50 cm long, scaberulous or glabrate as are the leaves, branched above, the branches obliquely ascending; leaves linear-lanceolate, 3–5 cm long and 2–7 mm broad, the basal usually marcescent; flowers solitary at tips of stems and branches; epicalyx scales 4, ovate, membranous-margined, abruptly terminating in a lance-subulate awn reaching the middle of the calyx tube or the base of calyx teeth; calyx 13–18 mm long, 4–5 mm broad, attenuate at summit, in upper part 5–8 mm broad, with acute teeth. June–July.

Pine woods, steppe meadows, steppes, and stony slopes. — European part: V.-Don (E. part), Transv., V.-Kama (E.); W. Siberia: U. Tob., Irt., Alt., Ob (S.); E. Siberia: Ang.-Say., Dau.; Far East: Ze.-Bu., Uss. (?); Centr. Asia: Ar.-Casp., Balkh. **Gen. distr.:** N. Mong., Dzu. Described from Russia.

19. **D. fischeri** Spreng. Cat. Sem. Horti Hal. (1810), nom. nud. et in Pugill. II (1815) 62 (descr.). **D. pineticola** Kleop. in Bull. du Jard. Bot. de Kieff XII–XIII (1931) 21. — **D. collinus** var. **ruthenicus** Fisch. Cat. Hort. Gorenk. (1808) nom. nud. — ? **D. ruthenicus** Roem. ex Poir. Enc. Suppl. IV (1811) 131. — **D. seguieri** auct. Fl. Ross., non Vill. — **D. comitissae annae** Andr. ex Trautv. in A. H. P. VIII (1883) 131, nom. nud. — **D. seguieri** b. **silvaticus** Shmal'g., Fl. Yugo-Zap. Ross. (1886) 76, non Koch. — Ic.: Rchb. Pl. crit. VI, tab. 742; Swed. Brit. Fl. Gard. III, tab. 245.

Perennial; rootstock creeping; stems 30–70 cm long, ascending at base, terete or at summit angular, branched, glabrous, occasionally glaucescent, densely leafy; leaves linear-lanceolate, long-acuminate, 4–10 cm long and 4–8 mm broad, asperous-margined, connate at base into sheath 3–5 mm long; flowers solitary or paired at ends of stems and branches, usually forming a loose few-flowered corymbiform panicle; calyx tubular, 15–17 mm long and 4–4.5 mm broad, slightly attenuate and purple-tinged at summit or very rarely the whole calyx colored; teeth lanceolate, acute, 5–6 mm long; epicalyx scales coriaceous, ovate, gradually or abruptly passing into a herbaceous awn, this 2–6 (10) mm long and reaching the middle of calyx tube; petal-limb dark rose, broadly obcuneate to suborbicular, 10–12 mm long and 8–10 mm broad, bearded on the upper surface, spotted at base, unequally toothed at summit. June–August.

Pine woods, open forests, and meadows. — European part: U. Dnp., U.V., M. Dnp., V.-Kama (W.). Endemic. Described from Moscow district.

20. *D. semenovii* (Rgl. et Herd.) Vierh. in Sitzungsberichte d. Kaiserl. Acad. Wissensch. CVII, Heft IX (1898) 1147. — *D. alpinus* var. *semenovii* Rgl. et Herd. in Bull. Soc. Nat. Mosc. XXXIX, 1 (1866) 531; Williams, Monogr. gen. *Dianthus* in Journ. Linn. Soc. (Bot.) XXIX (1893) 420. — *D. seguieri* β *silvaticus* *lusus macrosepalus* Rgl. et Schmalh. in A. H. P. V (1877) 244.

Perennial, densely tufted; stems numerous, ascending at base, 5–15 cm long; basal leaves marcescent; cauline leaves 4–7 pairs, linear, acute, 1.5–3 cm long and 1–2 mm broad, 3–5-veined, somewhat rough on the margin and on veins beneath, connate at base into sheath 1–2 mm long; flowers solitary or 2–4 on the stem; calyx cylindric, attenuate at summit, 15–19 mm long and 4–5.5 mm broad, pale green or faintly purple-tinged; teeth ovate-lanceolate, slender-pointed; epicalyx scales 4–6, ovate, tapering to a herbaceous awn, covering (one-half) two-thirds to three-quarters of calyx; petal-limb rose-purple, 11–12 mm long and 7.5–8 mm broad, unequally pectinate-toothed at summit, obsoletely hairy on upper surface. (Plate LII, Figure 3).

Slopes in the alpine zone, at altitudes between 2,000 and 2,500 m. — Centr. Asia: Dzu.-Tarb. (Dzhungarian Ala-Tau), E. T. Sh. Endemic. Described from the Kapal Mountains and Kara-Tau Range. Type in Leningrad.

21. *D. discolor* Smith, Bot. Mag. (1808) tab. 1162. — *D. montanus* M. B. Fl. taur.-cauc. I (1808) 328, non F. W. Schmidt (1791); Rupr. Fl. Cauc. 171. — *D. seguieri* β Ldb. Fl. Ross. I (1842) 277, non Vill. — *D. seguieri* β *montanus* Boiss. Fl. Or. I (1867) 504. — ? *D. caucasicus* Smith, Bot. Mag. (1804) tab. 795, non M. B. (1808); Grossg., Fl. Kavk. I, 432. — Ic.: Smith, op.cit., tab. 1162; Rchb. Pl. crit. V (1827) tab. 420. — Exs.: Pl. or. exs. no. 258.

Perennial; stems 20–40 cm long, ascending at base, often violet-tinged below, smooth or scarcely scabrid, branched above; lower leaves marcescent; median cauline leaves 3–5 cm long and 2–4 mm broad, rough on the margin, smooth elsewhere or scaberulous on the veins beneath, connate at base into sheath 1–1.5 mm long; stem leaves usually exceeding

internodes; flowers solitary at ends of stem and branches; calyx ca. 20 mm long and 6–7 mm broad; teeth acute, scaberulous on the margin, to 5–7 mm long; epicalyx scales 4, ovate, long-acuminate, herbaceous and scabrous in upper part, coriaceous below, the divergent subulate awn reaching the middle or up to the summit of calyx; petals one and a half times as long as calyx, unequally shallow-toothed; limb purple on the bearded upper surface, greenish-yellow beneath, 15 mm broad, cuneately narrowed to a claw. July–September.

Alpine and subalpine meadows, clearings, and mountain woods. — Caucasus: Gr. Cauc., Dag., E., W., and S. Transc. Endemic. Described from the Caucasian Mountains. Type in London.

Note. Among the various names proposed for this species, we were obliged to adopt, in conformity with rules of nomenclature, the name *discolor*, coined by Smith. Even though *D. caucasicus* has priority, it cannot be reliably applied to the species in question since, in both the illustration and in the description supplied by Smith, the petal-limb is represented as being deeply toothed and thus corresponding to *D. fragrans*. The possibility must be admitted that *D. caucasicus* Smith may be a hybrid.

Economic importance. The plant deserves introduction into cultivation for ornamental use.

22. *D. kusnezovii* V. Marcovicz in Not. Syst. ex Herb. Horti bot. Petropol. IV (1923) 31; Grossg., Fl. Kavk. II, 431. — *D. montanus* var. *nanus* C. A. M. Verzeichn. Pfl. Cauc. (1831) 211.

Perennial; stem erect or ascending, 10–20 cm long, commonly simple, monanthous, rarely 2- or 3-flowered, glabrous; leaves broadly lanceolate, acuminate, 2–4 cm long and 2–7 mm broad, narrowing toward base, 3-veined, asperous-margined; calyx oblong-cylindric, 18–20 mm long and 4–5 mm broad; teeth acute or acuminate, scarious-margined; epicalyx scales 2–4, covering half the calyx; ovate or oblong, abruptly long-awned, petals pink, as long as calyx tube; limb obovate, 10–12 mm long and 8 mm broad, with irregularly toothed margin. July–August.

Rocks and meadows in the alpine zone. — Caucasus: Gr. Cauc. (Klukhori Pass, Churkhur River near Elbrus, Shakh Dag mountain). Endemic. Described from Khlukhori Pass. Type in Leningrad.

827 23. *D. imereticus* (Rupr.) Schischk. in Bull. du Musée de Géorgie I (1928) 123; Grossg., Fl. Kavk. II, 432. — *D. montanus* f. *imeretica* Rupr. Fl. Cauc. I (1869) 173. — *D. collinus* α *imereticus* Williams in Journ. Linn. Soc. XXIX (1893) 387. — *D. seguieri* var. *subaggregatus* Alb. Fl. Colch. (1895) 30. — *D. montanus* var. *densiflorus* Som. et Lev. in A. H. P. XVI (1900) 64. — Ic.: Schischk., l. c., p. 122.

Perennial; stems several to numerous, 30–60 cm long, simple or branched, occasionally somewhat woody at base; leaves lanceolate to linear-lanceolate, acute, 4–7 cm long and 3–7 mm broad, usually twice length of internodes, rough-margined, 7-veined, connate at base into sheath 2–3 mm long; flowers short-pedicelled, in few-flowered clusters at ends of stems and branches; calyx cylindric, 20–30 mm long, usually

purple-tinged in upper part; teeth lanceolate, acute; epicalyx scales broad-ovate, abruptly mucronate, half length of calyx tube; petal-limb obovate-cuneate, 8–12 mm long and 7–10 mm broad, pink, short-toothed, hairy on upper surface. July–September.

Calcareous rocks. — Caucasus: W. Transc. Endemic. Described from Kutaisi district. Type in Leningrad.

24. *D. amurensis* Jacq. in Journ. Soc. Imp. Centr. Hort. VII (1861) 625.

Perennial; stems 40–45 cm long, branched, glabrous; leaves lanceolate, acute, 5 cm long and 5–7 mm broad, bright green, horizontally spreading or recurved, united at base into sheath 1–3 mm long; flowers solitary or in 3-flowered dichasia at ends of stems and branches; calyx tubular, 20 mm long and 4–5 mm broad, green; teeth lanceolate, acuminate, scarious-margined; epicalyx scales 4, ovate, abruptly or gradually pointed, usually half the length of calyx tube or reaching base of calyx teeth, closely appressed or spreading; petals rose-purple, rarely white (f. *albiflorus* Preobr.); limb ca. 15–20 mm long and 6–12 mm broad, bearded on upper surface, dark-spotted at base, deeply and unequally toothed at summit. June–August.

Meadows, dry turfy slopes, coppices, wood margins, sands, and river-valley pebbles. — Far East: Uss. Endemic. Described from cultivated specimens grown from seeds collected near the Amur River. Type in Paris.

25. *D. turkestanicus* Preobr. in Bull. Jard. Bot. Princip. XV (1915) 366, ex parte.

328 Perennial; rootstock woody; stems numerous, 20–40 cm long, erect, branched, scabrid-puberulent; leaves narrowly linear, 4–5 cm long and 2–4 mm broad, acute, scabrid-pubescent, connate at base into sheath 2–4 mm long, the lower marcescent, the upper often subulate-tipped, scabrous beneath; flowers solitary or sometimes 2 or 3 at ends of stems and branches; calyx oblong, 15–22 mm long and 4–6 mm broad, glabrous or (under magnifier) finely puberulous; teeth lanceolate, acute, minutely scabrid-puberulent, with ciliate margins; epicalyx scales 4–6 (8), coriaceous, broadly ovate, 8 mm long and 6 mm broad, abruptly terminating in a subulate herbaceous awn 3–10 mm long that sometimes reaches the base of calyx teeth; petals pink or purple; limb 15 mm long and 7–10 mm broad, short-hairy on the upper surface, shallowly toothed at summit. June–July.

Mountain meadows and herbaceous slopes. — Centr. Asia: Dzu.-Tarb., T. Sh. Gen. distr.: Dzu.-Kash. Described from Sairam Hsin-chiang. Type in Leningrad.

26. *D. pratensis* M. B. Fl. taur.-cauc. III (1819) 300; Shishkin in Fl. Yugo-Vost. IV, 310; Kleop. in Visnik Kiivsk. Bot. Sady XII–XIII (1931) 24. —

D. seguieri γ Ldb. Fl. Ross. I (1842) 277, ex parte. — *D. chlorocleucus* Fisch. in Hornem. Hort. Hafn. Suppl. (1819) 137. — *D. ochroleucus* Link., Enum. I (1827) 420, non Pers. — *D. tataricus* Fisch. ex DC. Prodr. I (1824) 359 in syn., nom. nud. — Ic.: Vierh. in Sitzb. Acad. Wiss. Wien, Math.-Nat. Kl. CVII, 1, tab. 2, f. 9.

Perennial, scarcely woody at base; stems ascending, 20–40 cm long, branched glabrous; leaves linear-lanceolate, 2–7 cm long and 2–4 mm broad, glabrous, scabrous-ciliate on the margin below, connate at base into sheaths 2–4 mm long; flowers solitary or paired at tips of stems and branches; calyx narrow-ovate, 10–17 mm long and 4–5 mm broad; epicalyx scales 4 or rarely 6, coriaceous, ovate, tapering to a herbaceous awn that reaches the middle of calyx tube or base of calyx teeth; petal-limb whitish-rose or rose-purple, 5–7 mm long and 3–4–5 mm broad, hairy on the upper surface, unequally toothed at summit. July–September. (Plate LII, Figure 1).

Water meadows and riverine sands. — European part: V.-Kama, V.-Don, Transv., L. V. Endemic. Described from Krasnoarmeisk (Sarepta). Type in Leningrad.

27. *D. kubanensis* Schischk. in Acta Inst. Bot. Ac. Sc. URSS, ser. 1, III (1936). — *D. guttatus* Preobr. in Acta Horti Bot. Jurjev. XV (1914) 23; Grossg., Fl. Kavk. II, 433, non M. B.

829 Perennial; stem 35–60 cm long, glabrous in lower part, scabrid-pubescent above, as are the leaves, branched, nodose; leaves linear-lanceolate, 4–6 cm long and 1–3 mm broad, exceeding internodes, 7-veined, acute, united at base into sheath 1–2 mm long; flowers solitary or paired at ends of stem and branches, forming a paniculate inflorescence; calyx tubular, 10–11 mm long and ca. 4 mm broad; teeth lanceolate, acuminate, often violet-tinged at base; epicalyx scales 4, attenuated from ovate base to a long linear-lanceolate scabrid-pubescent awn, this reaching middle of calyx tube or base of teeth; uppermost pair of leaves often close to and commonly overtopping calyx; petal-limb obovate, 7–8 mm long and 4–5 mm broad, rose-purple, blackish-spotted and bearded at base; capsule slightly exceeding calyx. July–August. (Plate LII, Figure 2).

Thickets. — Caucasus: Cisc. (Kuban River basin). Endemic. Described from N. W. Caucasus (Adyge Autonomous Oblast between the villages of Enem and Tokhtamukhai). Type in Leningrad.

28. *D. guttatus* M. B. Fl. taur.-cauc. I (1808) 328; III, 300; Klovov in Nauk. Zap. po Biolog. (1927) 10; Kleop. in Visnik Kiivs'kogo Bot. Sadu XII–XIII (1931) 25, pro max. parte. — *D. pratensis* b. *guttatus* Williams in Journ. Linn. Soc. XXIX (1893) 428; Shmal'g., Fl. I, 127. — *D. guttatus* falz-feini Pacz. in Izv. Gos. stepn. zapov. Askaniya-Nova I (1922) 96 (1923) 102. — Ic.: M. B. Centur. I, tab. VIII; Rchb. Pl. crit. tab. 654.

Perennial; stem 20–45 cm long, commonly branched, nodose, glabrous; leaves lance-linear, 4–8 cm long and 1–3 mm broad, exceeding internodes, 7-veined; the length of sheath half leaf width; flowers solitary at tips of stem and branches, long-pedicelled; calyx 15–18 mm long and ca. 4 mm broad; teeth broadly triangular, acute, often purple-tinged; epicalyx scales 4–6, the outermost 2 leaflike, terminating in a broadly linear awn equal to or exceeding calyx, the inner broader, with awn not reaching base of teeth; petal-limb obovate, 5–8 mm long, pinkish white-dotted above, yellowish-green beneath, unequally toothed; capsule equaling calyx; seeds 2.5 mm long and 2 mm broad. July–August. (Plate LII, Figure 4).

Steppes. — European part: Bl. Endemic. Described from Dnestr. Type in Leningrad.

Series 2. **Bicolores** Schischk. — Calyx scarcely enlarged at middle, ca. 2–4 mm broad; epicalyx scales one-third length of calyx, very rarely reaching half length of calyx tube. Plants commonly herbaceous at base.

29. **D. bicolor** Adams in Web. et Mohr, Beitr. zur Naturk. I (1805) 55, non M. B. (1808). — **D. caucasicus** M. B. Fl. taur.-cauc. I (1808) 327, non Smith (1804). — **D. bicolor** β **glabratus** Rupr. Fl. Cauc. (1869) 171, in observ. — **D. campestris** Boiss. Fl. Or. I, 504, quo ad pl. cauc.; Grossg., Fl. Kavk. II, 433.

830 Perennial; stems several, commonly erect, 50–65 cm long, glabrous or in lower part scabrous, simple or branched above; leaves lance-linear to linear, 2.5–4 cm long and 1–2.5 mm broad, scabrous or glabrous, acuminate, 3-veined, connate at base into sheath 1–2.5 mm long; flowers solitary at tips of stems and few branches; calyx cylindric, 20–23 mm long and 3–4 mm broad; epicalyx scales 4–6 (8), ovate-lanceolate, abruptly narrowing to a short subulate awn, with white membranous margin, covering one-third calyx tube; petal-limb reddish above, yellowish-green beneath, 5–8 mm long and ca. 3 mm broad, bearded on upper surface. July. (Plate LII, Figure 5).

Southern slopes and scrub. — Caucasus: Cisc., Dag., E. Transc. Endemic. Described from near Mineralnye Vody. Type in Moscow (?).

30. **D. campestris** M. B. Fl. taur.-cauc. I (1808) 326, 427; III, 298; Ldb. Fl. Ross. I, 278, part.; Boiss. Fl. Or. I, 504, ex parte.

Perennial; stem herbaceous or scarcely woody at base, 20–40 cm long, branched, usually covered in lower part with short soft patulous hairs, rarely glabrous; leaves lance-linear, acute, scabrid-pubescent or glabrous, 4–6 cm long and 2–4 mm broad, usually exceeding internodes, connate at base into sheath 2–4 mm long; flowers paired or solitary at ends of stem and branches, forming a loose paniculate inflorescence; calyx cylindric, 15–18 mm long; epicalyx scales 2 or 3 pairs, ovate, abruptly mucronate, scarious-margined, covering one-third to half the calyx; petal-limb obovate, pink and bearded above, greenish-yellow beneath, unequally sharp-toothed, 6–7 mm long and ca. 3 mm broad. June–July. (Plate LII, Figure 6).

Pine woods, beech forests, turfy slopes, riverine sands, and sandhills. — European part: U. Dnp., V.-Kama, L. Don, Bl., Crim., L. V., Transv.; W. Siberia: U. Tob. Endemic. Described from Crimea and S. Ukraine. Type in Leningrad.

31. **D. carbonatus** Klok. in Scient. Magaz. of Biology (1927) 15; Kleop. in Bull. Jard. Bot. de Kieff XII–XIII (1931) 27. — **D. campestris** b. **scaber** Schmalh. Fl. I (1895) 127, pro max. parte. — Ic.: Klok., l. c., f. 3, 4. — Exs.: H. Fl. R. Sov. Ukrain. no. 55.

833 Perennial; taproot stout, multicipital, giving rise to numerous flowering stems and sterile shoots; stems 10–25 cm long, slightly branched above, scabrid-pubescent as are the leaves; leaves narrowly lanceolate, 1.5–4 cm long and 1–1.75 mm broad, acuminate, connate at base into sheath 1–3 mm long; flowers solitary or in 2's or 3's at tips of stems and branches; calyx cylindric, 12–17 mm long and 2.5 mm broad, sparingly scabrous; epicalyx



PLATE LII. 1. *D. pratensis* M.B.— 2. *D. kubanensis* Schischk.— 3. *D. semenovii* (Rgl. et Herd.) Vierh.— 4. *D. guttatus* M.B.— 5. *D. bicolor* Adams.— 6. *D. campestris* M.B.

scales 4–6, ovate to ovate-lanceolate, awn-tipped, covering half the calyx tube, minutely scaberulous; petals reddish-rose; limb obovate, 5–6 mm long and 2.5 mm broad, dark-dotted and hairy at throat, toothed at summit; seeds black, ellipsoid, 2 mm long and 1.25 mm broad. July–August.

Stony, often chalky slopes, and gravelly and sandy steppes. — European part: M. Dnp. (S.), V.-Don, Bl., Crim. (Perekop). Endemic. Described from S. Ukraine (Stalin district and others). Type in Kharkov.

32. *D. hypanicus* Andr. in Ischisl. rast. Podol'sk. gub. (1860) 18; Pachoskii in Trud. Yur'ev. Bot. Sada VI (1905) 149; Klok. in Nauk. Zap. po Biologii I (1927) 11. — Ic.: Klok., l. c., tab. 1.

Perennial; stems 10–20 (25) cm long, commonly much branched from base, scarcely scabrous or subglabrous; leaves linear to linear-subulate, 1.5–3 (4.5) cm long and 1–2 mm broad, stiffish, acute, spreading, scarcely scabrous, connate at base into sheath 0.5–1.5 mm long, with rather long leafy shoots in the axils; flowers solitary at tips of branches; calyx tubular, 13–15 mm long, usually more or less purple-tinged; epicalyx scales 4, rarely 6, ovate, abruptly terminating in a short herbaceous point, membranous-margined, one-quarter to one-sixth the length of calyx; petals dark rose, sometimes greenish outside; limb obovate, 8 mm long and 4 mm broad, sparsely hairy on the upper surface, deeply sharp-toothed at summit. June–July.

Granite rocks and granite-gneiss outcrops. — European part: Bl. (Pribuzh'e-Megiya, Konstantinovka, Bogdanovka, Bobrinets, Rozanovka, Aleksandriya). Endemic. Described from the granites of the Bug River (Bogopol and Konstantinovka). Type in Kiev; cotype in Leningrad.

33. *D. elatus* Ldb. Fl. Alt. II (1830) 136; Fl. Ross. I, 280. — Ic.: Ldb. Ic. pl. Fl. Ross. V, tab. 420.

Perennial; stems 25–50 cm long, scabrous or glabrate, branched above; leaves narrowly linear, 2.5–4 cm long and 1–2 mm broad, acute, asperous-margined, connate at base into sheath 1.5–2 mm long; flowers solitary or paired at ends of stems and branches; calyx 14–20 mm long, cylindric, somewhat enlarged at the middle, glabrous; teeth ovate, scarious-margined, ciliate, mucronate; epicalyx scales commonly 6, rarely 4 or 8, ovate, long-acuminate, one-third to half the length of calyx; petal-limb 6–10 mm long, pale purple and hairy above, yellowish-green beneath, rather deeply and unequally toothed at summit. July.

Dry desert slopes. — W. Siberia: Irt., Alt. (Kurchum Range); Centr. Asia: Balkh. (Zaisan River and Tarbagatai foothills). **Gen. distr.:** Chinese Dzhungaria. Described from the Irtys valley. Type in Leningrad.

34. *D. preobrashenskii* Klok. in Journ. Agric. Bot. Charkov. I, III (1927) 170.

Perennial; stems several, usually somewhat ascending at base, 15–30 cm long, branched from base, scabrid-puberulent or glabrous; leaves linear, 1.5–2.5 cm long and 1–2 mm broad, acute, obliquely ascending, glabrous or scabrous, 3-veined, connate at base into sheath 1–2.5 mm long; flowers solitary at ends of stems and branches, forming a loose obscurely

corymbiform panicle; calyx cylindric, 18–25 mm long and 3–4 mm broad; teeth oblong-lanceolate, abruptly pointed, often violet-tinged; epicalyx scales ovate, with rather broad white membranous margin, abruptly terminating in a long herbaceous subulate awn one-third to half the length of calyx; petals pink above, yellowish-green beneath; limb obovate, 5–8 mm long, pectinate-toothed at summit, hairy on the upper surface. July – August.

Stony slopes and open mountain woods. – Caucasus: S. Transc.

Gen. distr.: Arm.-Kurd. Described from Mount Ararat. Type in Leningrad.

35. ***D. eugeniae*** Kleop. in Bull. Jard. Botan. de Kieff XII–XIII (1931) 5.

Perennial; rootstock more or less creeping; stems 40–60 cm long, ascending, terete, glabrous, simple or branched above; leaves linear-lanceolate to linear, 4–7 cm long and 2–5 mm broad, acuminate, scarcely roughened on the margin, the length of sheath equaling width of leaf; flowers 2 or 3 at tips of branches, forming a corymbose-paniculate inflorescence; calyx tubular, 15–17 mm long and 3–4 mm broad, green or purple-tinged; teeth lanceolate, slender-pointed, 5–6 mm long; epicalyx scales coriaceous, ovate, membranous margined, sparingly ciliate, abruptly terminating in a scabrid lance-subulate awn that reaches the middle of calyx tube or calyx teeth; bracts subtending calyx 2, linear-subulate, mostly exceeding calyx; petals purple; limb 8–10 mm long, hairy in upper part, black-dotted below, toothed at summit. June – August.

835 Steppes, coppices, clearings, and wood margins. – European part: M. Dnp., V.-Don. (S. W.), L. Don. Endemic.

Note. The specimens identified by Kleopov as *D. eugeniae* Kleop., that we have seen, make the impression of being a hybrid between *D. campestris* M. B. and of *Dianthus* species of the section *Carthusiani*. Further investigations and field observations are needed. Having drawn the attention of investigators to this plant, we considered it opportune to give its full description and to approach it for the time being as a distinct species.

Series 3. ***Pallidiflori*** Schischk. – Calyx 10–15 mm long; petal-limb whitish or pale rose; plant often woody at base, usually much branched.

36. ***D. pallidiflorus*** Ser. in DC. Prodr. I (1824) 358; Ldb. Fl. Ross. I, 279; Boiss. Fl. Or. I, 504. – *D. campestris* ssp. *pallidiflorus* Schmalh. Fl. I (1895) 127. – *D. pallens* M. B. Fl. taur.-cauc. I (1808) 325; III, 298, non Sibth. et Smith (1806). – *D. meoticus* Klok. in Scient. Magaz. of Biology (1927) 13. – Ic.: Klok., l. c., t. 2.

Perennial; stems several to numerous, branched from base or from the middle, 25–40 cm long, scaberulous in lower part as are the leaves, glabrous above; leaves linear, 3–6.5 cm long and 0.5–2 mm broad, acuminate, asperous-margined, connate at base into sheath 2–5 mm long; flowers solitary or paired at ends of branches, forming a loose corymbose-paniculate inflorescence; calyx cylindric, 12–14 mm long and 2–5 mm broad, pale green; teeth lanceolate, acuminate; epicalyx scales 4 or 5; coriaceous, broad-ovate, scarious-margined, terminating in a short subulate awn that covers one-third of calyx tube; petals white or pale rose; limb obovate,

5–6 mm long and ca. 3 mm broad, sparsely hairy on upper surface, unequally sharp-toothed at summit. June–July.

Steppes. — European part: Bl., Crim. (Kerch Strait), L. Don, L. V. Endemic. Described from Krasnoarmeisk (Sarepta). Type in Leningrad.

37. *D. ramosissimus* Pall. in Poir. Enc. meth. Suppl. IV (1816) 130; Kryl., Fl. Zap. Sib. V, 1102.

Perennial; taproot stout, 2–6 mm thick; stems several, 20–50 cm long, branched from the middle, glabrate; leaves narrowly linear, 1–4 cm long and 1–1.5 mm broad, acute, often convolute, connate at base into sheath 1–2 mm long; flowers solitary at ends of branches, forming a loose corymbose-paniculate inflorescence; calyx cylindric, 12–14 mm long and ca. 3 mm broad, pale green; teeth triangular, scarious-margined; epicalyx scales 4, rarely 6, coriaceous, elliptic, broadly scarious-margined, short-acuminate, covering one-third the calyx tube; petals white and sparsely hairy above, greenish beneath; limb obovate, 5 mm long and 3–5.5 mm broad, obtusely short-toothed at summit; capsule cylindric, ca. 15 mm long and 3.5 mm broad. June–August.

Meadow steppes, pine woods, and semideserts. — W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Ar.-Casp., Balkh. Described from Siberia (?). Type in Leningrad.

38. *D. rigidus* M. B. Fl. taur.-cauc. I (1808) 325; III, 298; Ldb. Fl. Ross. I, 280; Shishkin in Fl. Yugo-Vost. IV, 309. — *D. campestris* ssp. *rigidus* Schmalh., Fl. I (1895) 127. — Ic.: Trattinick, Thes. Bot. (1819) tab. 68.

Perennial; stems woody and profusely branched at base, 10–50 cm long, puberulent in lower part, glabrous above; leaves linear, 1–2.5 cm long and ca. 1 mm broad, acute, rough-margined, connate at base into sheath 1–1.5 mm long; flowers solitary at tips of stems and branches; calyx 10–12 mm long, with acute teeth; epicalyx scales 4–6, ovate, acute or abruptly mucronate, narrowly scarious-margined, scarcely scabrous on the back above, covering one-quarter to one-third of calyx; petal-limb whitish, sometimes roseate, oblong, 4–7 mm long and 3–5 mm broad; teeth 4–8 (10), unequal, acute; capsule about equaling calyx. June–July. (Plate LIII, Figure 4).

Dry slopes, chalky hills, and sands. — European part: Crim. (Tarki), L. Don, L. V.; W. Siberia: U. Tob. (S. part), Irt.; Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from Krasnoarmeisk (Sarepta). Type in Leningrad.

39. *D. uralensis* Korsh. Tentamen Fl. Rossiae orientalis (1898) 59; Shishk. in Fl. Yugo-Vost. IV, 310. — *D. collinus* subsp. *uralensis* Fedtsch. et Fler., Fl. Evrop. Ross. II (1909) 407.

Perennial, woody and profusely branched at base, forming a subspherical bush; stems numerous, congested, 10–30 cm long, erect, branched, scabrid-pubescent as are the leaves; leaves linear, 1–2.5 cm long and 1–2 mm broad, 3-veined, acute, the upper narrowly linear to linear-subulate; flowers solitary at ends of stems and branches; calyx cylindric, 11–13 mm long, glabrous; epicalyx scales 4, obovate or oblong, mucronate, membranous-

margined, covering one-third of calyx; petal-limb pink above, greenish-yellow beneath, cuneate-obovate, 7 mm long and 4–6 mm broad. July–August. (Plate LIII, Figure 6).

Rocks and stony slopes, dry steppes, and fallows. — European part: V.-Kama, S. Ural; W. Siberia: U. Tob. Endemic. Described from S. Ural (Bikberdin, Tyavgulovo). Type in Leningrad.

40. *D. kirghizicus* Schischk. sp. nova in Addenda V, p. 684.

Perennial; stems several, branched almost from base, 15–35 cm long, glabrous; leaves of nonelongated sterile radical shoots narrowly linear, 2.5–3 cm long and ca. 1 mm broad, glabrous, glaucous, rough-margined, acute, often convolute; cauline leaves similar, 1–1.5 mm broad, usually flat, connate at base into sheath 1–2 mm long; flowers solitary or in 2's or 3's at ends of branches, forming a loose corymbose-paniculate inflorescence; calyx cylindric, 12–15 mm long and 2–3.5 mm broad, pale green; teeth lanceolate, acute, scarious-margined, ciliate; epicalyx scales 4, ovate, scarious-margined, acute, covering one-third of calyx tube; petals whitish-rose (?); limb oblong, 5–6 mm long and ca. 2 mm broad, bearded on upper surface, rather deeply sharp-toothed at summit. August.

Riverside pebbles and slopes. — Centr. Asia: W. T. Sh. Endemic. Described from Kugart River near the Dzhelalabad railway station. Type in Leningrad.

41. *D. humilis* Willd. ex Ldb. Fl. Ross. I (1842) 280; Boiss. Fl. Or. I, 505; Shmal'g., Fl. I, 127. — *D. hirtus* M. B. Fl. taur.-cauc. I, 326, non Lam., nec Vill.; DC. Prodr. I, 358, quo ad plant. taur. — *D. sterilis* Stev. ex Ldb., l. c. — *D. virgineus* Hbl. Fizich. opis. Tavrich. obl. (1785) 165, non L. nec Gren. et Godr. — Exs.: HFR no. 960.

Perennial, woody in lower part; stems numerous, slender, simple or slightly branched, scabrous, 5–35 cm long; leaves filiform-subulate, 3-veined, asperous-margined, 0.5–2 cm long and 0.5–1 mm broad, 1–several-flowered; calyx 10–15 mm long; teeth lanceolate, acute; epicalyx scales 2 or 3 pairs, ovate, membranous-margined, subulate-pointed, covering half the calyx; petal-limb broadly obovate, pink, 4 mm long and 3 mm broad. June–July. (Plate LIII, Figure 7).

Stony and dry slopes, and open woods on stony soils. — European part: Bl., Crim. Described from Crimea. Type in Berlin.

Series 4. *Transcaucasici* Schischk. — Plants woody in lower part, with linear leaves 2–3 mm broad; calyx 15–30 mm long.

42. *D. acantholimmonoides* Schischk. in Bull. du Musée de Géorgi (1929) 121. — *D. cristatus* Preobr. in Sched. ad Herb. Ac. Sc. URSS, non Boiss.

Perennial, woody at base; stems numerous, ascending below, then erect, 10–40 cm long, scabrid-puberulent in lower part, glabrous above; leaves obliquely ascending, linear, 2–6 cm long and ca. 2 mm broad, 3–9-veined, acute to subspinescent, hispid on the margin and on the midrib, connate at base into sheath 2 mm long; flowers solitary, terminal; calyx oblong-cylindric, 18–30 mm long; teeth lanceolate, acuminate, scarious-margined, densely ciliate, finally sometimes deflexed; epicalyx

scales 4–6, ovate at base, abruptly terminating in a subulate scabrous awn that reaches the middle of calyx tube; petal-limb obovate, pink or greenish-pink and hairy above; capsule shorter than calyx; seeds large, ca. 3 mm long. July–August. (Plate LII, Figure 5).

Rocks and stony slopes. — Caucasus: W. Transc. (from Novorossiisk to Sochi). Endemic. Described from Markotkh Range in Novorossiisk district. Type in Leningrad.

Note. This unusual species, recently described by us, is reported by V. P. Maleev as being of striking appearance at flowering time and is recommended for horticultural use.

43. *D. grossheimii* Schischk. in Acta Inst. Bot. Ac. Sc. URSS sér. 1, III (1936).

Perennial, scarcely woody at base; taproot stout, multicipital; stems numerous, ascending at base, 20–30 cm long, minutely scabrid-puberulent, densely leafy; leaves lance-linear, the basal marcescent; median leaves 3–3.5 cm long and ca. 3 mm broad, acute, minutely scaberulous or glabrate, 5-veined, connate at base into sheath to 2 mm long; flowers short-pedicel, forming a rather compact corymbiform terminal inflorescence or rarely solitary; calyx 15–17 mm long; epicalyx scales 4 pairs, covering one-third to almost half the calyx, the outer linear-lanceolate, the inner ovate, scarious-margined, abruptly terminating in a herbaceous awn; petals pinkish-red, one and a half times as long as calyx; limb broadly obovate-cuneate, shallowly and unequally toothed at summit, hairy on the upper surface. September.

Stony slopes. — Caucasus: S. Transc. (Daralagez). — Endemic. Described from Alachen village. Type in Baku; cotype in Leningrad.

Subsection 2. ASPERI Vierh. in Sitzber. Acad. Wiss. Wien, Math.-Nat. K. CVII 1 (1898) 1067. — Plants with a basal leaf rosette, green, pubescent; epicalyx scales (in our species) 2.

44. *D. deltoides* L. Sp. pl. (1753) 411; Ldb. Fl. Ross. I, 281; Shmal'g., Fl. I, 128; Shishk. in Fl. Yugo-Vost. IV, 311; Kryl., Fl. Zap. Sib. V, 1101. — *D. crenatus* Gilib. Fl. lithuan. V (1785–87) 161. — Ic.: Syreishch., Fl. Mosk. gub. II, 112; Rchb. Ic. Fl. Germ. V–VI, tab. 263, f. 5040.

Perennial, loosely tufted; rootstock slender, creeping, giving rise to flowering stems and sterile leafy shoots; stems ascending, 10–40 cm long, scabrid-puberulent as are the leaves; leaves of sterile shoots 1.5–3 cm long and 3–5 mm broad, obtuse, ciliolate at the attenuate base; cauline leaves linear to linear-lanceolate, 1–3 mm broad, 3-veined, acute, rough-margined, connate at base into a very short sheath; calyx 12–15 mm long, puberulent or glabrous; teeth oblong-lanceolate, acute; epicalyx scales 2, elliptic, subulate-cuspidate, one-third to half the length of calyx; petals pinkish-red, with a ring of purple dots and few long hairs at throat; limb obcuneate, sharp-toothed at summit. June–July.

Meadows, open woods, and wood margins. — European part: Lad.-Ilm., Dv.-Pech., U. Dnp., U. V., M. Dnp., V.-Kama, Crim. (Simferopol' — introduced?), V.-Don, L. Don (N.), Transv.; W. Siberia: Ob, Ang.-Say.

(Yurty station), Yenisei (Yenisei district); Far East: Uss. (introduced).
Gen. distr.: Scand., Centr. Eur. Described from the meadows of Europe
Type in London.

Section 2. **LEIOPETALI** Boiss. Fl. Or. I (1867) 479. — *Tetralepides leiopetala* Williams in Journ. of Bot. XXIII (1885) 346; in Journ. Linn. Soc. XXIX (1893) 448. — Petal-limb white, yellowish-green or pale pink, entire or toothed, beardless at base.

Series 1. **Leptopetali** Schischk. — Epicalyx scales broad-obovate, one-fifth to one-quarter length of calyx; petals whitish-yellow.

45. **D. lanceolatus** Stev. ex Rchb. Pl. crit. VI (1828) 34. — *D. elongatus* C. A. M. Verzeichn. Pfl. Cauc. (1831) 211; Ldb. Fl. Ross. I, 282; Boiss. Fl. Or. I, 484; Rupr. Fl. Cauc. 171, in obs.; Williams in Journ. Linn. Soc. XXIX (1893) 452; Grossg., Fl. Kavk. II, 430 ex parte. — *D. bicolor* M. B. Fl. taur.-cauc. I (1808) 329; III, 301, non Ad. (1805). — *D. leptopetalus* Boiss., l. c., pro pl. cauc.; Kleop. in Bull. du Jard. Bot. de Kieff XII–XIII (1931) 31, ex parte. — Ic.: Rchb., l. c., tab. 747.

840 Perennial; stems solitary to several, 40–60 cm long, erect, rarely flexuous (f. *flexuosus* Preobr.), nodulose, simple or branched above, glaucous, glabrous (f. *glaber* Preobr.) or pubescent in lower part (f. *pubescens* Preobr.); lower leaves linear, to 7 cm long, exceeding internodes, 2–3 mm broad, 5–7-veined, with crenulate margin, connate at base into a sheath; median and upper leaves shorter; flowers long-pediceled, solitary at ends of stems and branches; calyx 17–22 mm long and 4–6 mm broad, teeth acuminate, ciliate; epicalyx scales coriaceous, whitish, usually abruptly terminating in a green awn 1–4 mm long, appressed to and covering one-fifth to one-quarter of calyx; petals one and a half times as long as calyx, whitish-yellow or faintly roseate; limb oblong, 10–15 mm long and 4–6 mm broad, unequally denticulate at summit. June–July. (Plate LIII, Figure 3).

Steppes and stony slopes. — European part: Bl., M. Dnp., V.-Don, L. Don, L. V. (S. W. part); Caucasus: Cisc., W. Transc. (Novorossiisk, Gelendzhik). Endemic. Described from southern Podolye.

46. **D. leptopetalus** Willd. Enum. Hort. Berol. (1809) 468; Ldb. Fl. Ross. I, 281, ex parte; Williams in Journ. Linn. Soc. XXIX (1893) 469, part; Shmal'g., Fl. I, 128, part.; Shishk. in Fl. Yugo-Vost. IV, 311; Kryl., Fl. Zap. Sib. V, 1105. — *D. pomeridianus* M. B. Fl. taur.-cauc. I (1808) 329, quoad pl. Sarept., non L. — *D. leptopetalus* ssp. *typicus* Kleop. in Bull. du Jard. Bot. de Kieff XII–XIII (1931) 31, ex parte et subsp. *wolgensis* Kleop., l. c. (1931) 33. — *D. wolgensis* Kleop. in sched. ex, l. c., 33.

Perennial; stems solitary to several, 25–50 cm long, erect, simple or branched above, glaucous, commonly glabrous, very rarely in lower part scabrid-pubescent; leaves narrowly linear, 2–9 cm long and 0.5–1.5 mm broad, acute, convolute, glabrous; flowers solitary at tips of stems and branches; calyx cylindric, 23–30 mm long and 3–4 mm broad; teeth lanceolate, acute, narrowly scarious-margined, ca. 5 mm long; epicalyx

scales 4, coriaceous, obovate, membranous-margined, with awn 1–2 mm long, covering one-fourth of calyx; petals yellowish-green, dingy-brown beneath; limb oblong, 14–15 mm long and 2–4 mm broad. June–July. (Plate LII, Figure 1).

Steppes and dry slopes. — European part: V.-Don (E. part), L. V., L. Don (part adjoining L. V.); W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from Krasnoarmeisk (Sarepta). Type in Berlin.

Note. Willdenow apparently included under *D. leptopetalus* plants from both the Volga region and from the Caucasus. We consider the latter to be a distinct species, *D. lanceolatus* Stev., and we retain Willdenow's appellation for the Volga plant, taking into consideration that it was first reported from Sarepta.

47. *D. schemachensis* Schischk. in Tr. po geobot. obsledovaniyu pastbishch SSR Azerbaidzhana, no. 7 (1931) 90. — Ic.: l. c., tab. VI. — Exs.: Fl. cauc. exs. no. 104.

841 Perennial; stem 5–18 cm long, densely leafy, usually simple, 1-flowered, very rarely branched above, erect or at base ascending, puberulent below or glabrous, the internodes ca. 1 cm long; leaves linear-lanceolate, 2–3 cm long and 1–3 mm broad, greatly exceeding internodes, the lower marcescent, 5–7-veined, ciliolate, acuminate, connate at base into a short sheath; calyx pale green, oblong, cylindric, 21–30 mm long and 5–6 mm broad; teeth lanceolate, sparingly hairy on the margin; epicalyx scales 4, coriaceous, broad-ovate, 5–6 mm long, abruptly terminating in a subulate often herbaceous awn of varying length; petal-limb broad-ovate to suborbicular, 6–8 mm long and 5 mm broad, dark violet on the upper surface, roseate beneath, unequally toothed. May–June.

Stony and turfey slopes in the alpine and subalpine zones. — Caucasus: Dag., E. Transc. Endemic. Described from Shemakh district (Azerbaidzhan). Type in Baku.

*48. *D. andronakii* Woron. nom. nov. in schedis. — *D. tristis* Woron. in Mon. du Jard. bot. de Tiflis X (1908) 25, non Vel. (1890). — Ic.: Woron., l. c. (1908) tab. 1.

Perennial; stems several, 35–53 cm long, glabrous, subterete to 4-angled, branched; leaves linear, 3–5 cm long and 2–3 mm broad, 5–7-veined, slightly asperous-margined, the lower prostrate, the upper obliquely ascending, acute, connate at base into sheath ca. 3 mm long; flowers solitary at tips of stems and branches; calyx cylindric, 23–27 mm long and 4.5–5 mm broad, in fruit to 7 mm broad; teeth acute, ciliate-margined; epicalyx scales 4–6, broad-ovate or obovate-rhombic, 5–6 mm long and 3–4 mm broad, obtuse and somewhat divergent, pale yellow or stramineous in lower part, with a green triangular spot above; petal-limb dingy-stramineous, dark green beneath, cuneate-obovate, 5–6 mm long, toothed at summit; capsule 18 mm long and 6 mm thick. July.

Dry stony slopes and taluses. — Not found to date in the USSR, but occurring in the adjoining regions of Turkey (Chorokh River in Artvin district). Endemic. Described from Chorokh Pass. Type in Leningrad.

49. *D. marschallii* Schischk. in Journ. of the Gouvernement Bot. Gard. Nikita X, 2 (1928) 39. — *D. bicolor* M. B. Fl. taur.-cauc. I (1808) pro parte, non Adams (1805); Ldb. Fl. Ross. I, 282. — *D. bicolor* var. *minor* M. B. Fl. taur.-cauc. III (1819) 301. — *D. cinnamomeus* var. *glaber* Williams in Journ. Linn. Soc. XXIX (1893) 462. — *D. leptopetalus* ssp. *bicolor* Schmalh. Fl. I (1895) 128. — *D. leptopetalus* var. *bicolor* Fedtsch. et Fler. Fl. Evrop. Ross. II (1910) 408. — *D. saxatilis* Pall. Ind. taur. (1797) nom. nud.

842 Perennial; stems solitary to numerous, erect or ascending, glabrous or in lower part scabrid-puberulent, branched above, 20–40 cm long; leaves linear, 5–7-veined, acute or acuminate, asperous-margined, 2–8 cm long and 1–2.5 mm broad, the length of sheath twice to three times leaf width; epicalyx scales 4, broad-ovate, abruptly short-acuminate, covering one-quarter to one-third of calyx; calyx ovoid, 12–20 mm long; teeth ovate-lanceolate, acute; petal-limb 17–23 mm long, lurid above, roseate-plumbeous beneath, toothed at summit. May–June. (Plate LIII, Figure 2).

Clayey and stony slopes, steppes, and juniper woods. — European part: Bl. (Odessa), Crim. **Gen. distr.:** Bessarabia. Described from the S. coast of Crimea. Type in Leningrad.

Note. Some years ago (Schischkin, l. c.) we were obliged to coin a new name for this plant, since the most current name, *D. bicolor* M. B. (1908), could not be retained for two reasons. In the first place, this name had already been used by Adams (1805) for another species. Secondly, in Biebersteins's herbarium, two different plants are kept under this name, one of them being *D. leptopetalus* Willd., the other — our plant. Bieberstein conceived as the typical species *D. bicolor* what we now designate as *D. leptopetalus* Willd. As for the small-flowered Crimean form, he referred to it in a later publication (1819) as *D. bicolor* var. *minor* M. B. The distribution of typical *D. marschallii* to the west of Crimea has not as yet been ascertained; this species does not apparently spread beyond Bessarabia (?), while in Transcaucasia *D. marschallii* is replaced by another species, namely *D. inamoenus* Schischk.

50. *D. inamoenus* Schischk. sp. nova in Addenda V, p. 685. — *D. marschallii* Grossg., Fl. Kavk. II (1930) 431, non Schischk.

845 Perennial; stems several, somewhat ascending at base, 10–45 cm long, scabrid-puberulent in lower part as are the leaves, glabrous above; leaves linear, 3–7 cm long and 1–3.5 mm broad, acute, 5–7-veined, rough-margined, connate at base into sheath ca. 2 mm long; flowers solitary and ends of stems and few obliquely ascending branches; calyx cylindric, attenuate at summit, 14–16 (18) mm long; epicalyx scales 4, coriaceous, broad-ovate, terminating in a short green mucro, closely appressed to calyx, covering one-third length of calyx tube; petals yellowish-green, oblong to obovate, 5–10 mm long and 2–4 mm broad, unequally 3-toothed at summit. May–June.

Stony slopes. — Caucasus: E. and S. Transc. Endemic. Described from the vicinity of Tbilisi. Type in Leningrad.

Note. A form occurring in the Baku area occupies an intermediate position between *D. inamoenus* Schischk. and *D. schemachensis* Schischk.



PLATE LIII. 1. *Dianthus leptopetalus* Willd.— 2. *D. marschallii* Schischk.— 3. *D. lanceolatus* Stev.— 4. *D. rigidus* M.B.— 5. *D. acantholimonooides* Schischk.— 6. *D. uralensis* Korsh.— 7. *D. humilis* Willd.

51. *D. azkurensis* Sosn. in Mon. du Jard. bot. de Tiflis. Nouv. Ser. I (1922-23) 74.

Perennial; stems numerous, from a branched rootstock, clothed with remnants of dead leaves, 20-40 cm long, scabrous in lower part, glabrous above, simple or branched in upper part; lower leaves marcescent; median leaves narrowly linear, ca. 6 cm long, involute-margined, 3-veined in lower part, hispid-margined, the length of sheath twice leaf width; flowers on stem 1-3; calyx oblong-cylindric, 9-10 mm long; teeth triangular, short-acuminate; epicalyx scales 4, broad-ovate, mucronate, covering one-third of calyx; petals whitish-yellow, the limb ca. 4 mm long. August.

Rocks. — Caucasus: E. Transc. Endemic. Described from a location between Akhaltsikh and Atskhur. Type in Tbilisi.

Series 2. *Floribundi* Schischk. — Epicalyx scales ovate or ovate-lanceolate, one-third to half length of calyx or reaching calyx teeth; petals pink or white.

52. *D. floribundus* Boiss. im. Tchih. As. Min. I (1860) 221; Boiss. Fl. Or. I, 490; Grossg., Fl. Kavk. II, 429.

Perennial; taproot stout; stems numerous, ascending at base, 15-25 cm long, branched, rarely simple; leaves narrowly linear, 1-2 cm long, the basal to 4 cm long and 0.5-1 mm broad, 3-5-veined, asperous-margined, connate at base into sheath 2-3 mm long; calyx narrowly cylindric, 15-18 mm long and 3 mm broad; teeth lanceolate, acute; epicalyx scales ovate, pale green, whitish-margined, abruptly mucronate, covering one-third the length of calyx tube; petal-limb pale pink, oblong, 4 mm long and ca. 2 mm broad, with few sharp and rather long teeth at summit. June-July.

Stony slopes. — Caucasus: S. Transc. **Gen. distr.:** Arm. -Kurd. Described from upper reaches of the Araks River. Type in Geneva.

846 53. *D. petraeus* M. B. Fl. taur.-cauc. I (1808) 328; III, 300, non Waldst. et Kit. (1812); Rupr. Fl. Cauc. 168. — *D. liboschitzianus* Ser. in DC. Prodr. I (1824) 360; Ldb. Fl. Ross. I, 282; Boiss. Fl. Or. I, 487. — ? *D. cretaceus* Ad. ap. Weber et Mohr, Beiträge I (1805) 56; Shishk. in Fl. Tiflisa I, 210; Grossg., Fl. Kavk. II, 429. — *D. integerrimus* Bge. ex Boiss., l. c. (1867) 487. nom. — *D. liboschitzianus* β *integerrimus* Boiss., l. c. (1867) 487. — Exs.: Pl. or. excis. no. 332.

Perennial; stems numerous, 20-40 cm long, simple or rarely branched, glabrous; leaves linear-lanceolate, 2-4 cm long and ca. 1 mm broad, acute, asperous-margined, connate at base into sheath 2-3 mm long; flowers solitary, terminal; calyx oblong-cylindric, ca. 20 mm long; epicalyx scales 4, ovate, abruptly awn-tipped, sometimes surpassing calyx; petal-limb white, toothed. July-August.

Alpine and subalpine meadows. — Caucasus: Gr. Cauc., E., W., and S. Transc. **Gen. distr.:** As. Min., Arm. -Kurd. Described from Georgia. Type in Leningrad.

54. *D. multicaulis* Boiss. et Huet in Boiss. Diagn. sér. II, V (1856) 53, non Pall. (nom. nud.). — *D. liboschitzianus* γ *multicaulis* Boiss. Fl. Or. I (1867) 487; Grossg., Fl. Kavk. II, 430. — *D. siemienkiewiczii* Bordz. in Fedde, Repert. sp. nov. XXX (1932) 364.

Perennial, glabrous throughout; stems numerous, 10–40 cm long, erect, simple and monanthous or branched, with obliquely ascending branches; leaves linear, 5–7 cm long and 1.5–2.5 mm broad, acuminate, slightly asperous-margined, the length of sheath several times the leaf width; flowers solitary at ends of stems and branches; calyx cylindric, 13–15 mm long, reddish-violet; teeth lanceolate, acuminate, with white membranous margin, softly ciliate; epicalyx scales 4, oblong to ovate-oblong, violet-tinged, abruptly subulate-tipped, usually reaching the base of calyx teeth; petals white or pink; limb broadly obovate, 5–5.5 mm long. July.

Subalpine meadows. — Caucasus: S. Transc. **Gen. distr.:** Arm.-Kurd. Described from Palanteken Range (Turkish Armenia). Type in Geneva.

55. **D. fragrans** Adams in Weber et Mohr, Beitr. I (1805) 56, non Salisb. (1807); Ldb. Fl. Ross. I, 283; Boiss. Fl. Or. I, 491; Grossg., Fl. Kavk. II, 429. — Ic.: M. B. Cent. Pl. rar. I, tab. 28. — Exs.: HFR no. 405.

847

Perennial; stem several, 30–60 cm long, erect, simple; basal leaves numerous; cauline linear-subulate, 3–10 cm long and ca. 1 mm broad, shorter than internodes, acute, asperous-margined, sheathing at base; flowers solitary or in 2's or 3's at the summit of stems; calyx tubular, 25–40 mm long, with acuminate teeth; epicalyx scales 6–8, coriaceous, ovate, tapering to awn the length of calyx, covering the calyx tube up to or beyond the middle; petals white; limb obovate, dissected to one-third into acute teeth. July–August.

Clearings, subalpine meadows, stony slopes, and calcareous rocks. — Caucasus: Gr. Cauc., Dag. Endemic. Described from Konstantinogorsk district (N. Caucasus).

56. **D. talyschensis** Boiss. et Buhse, Aufz. (1860) 34; Boiss. Fl. Or. I, 491; Grossg., Fl. Kavk. II, 429. — **D. stenocephalus** var. **glaber** Williams in Journ. Linn. Soc. XXIX (1893) 446.

Perennial; stem 25–50 cm long, simple, 1–3-flowered, glabrous; leaves linear, 5–12 cm long and 2–4 mm broad, greatly exceeding internodes, connate at base into sheath 4–5 mm long; calyx cylindric, 25–35 mm long, with long-acuminate teeth; epicalyx scales 4–6, coriaceous, elliptic-lanceolate, tapering to subulate awn that exceeds calyx; petal-limb pink (?), broadly obcuneate, ca. 10 mm long, 6 mm broad in upper part, shallowly toothed. July.

Wooded slopes. — Caucasus: Tal. **Gen. distr.:** N. Iran (?). Described from Talysh (between Ardebil and Astofa). Type in Geneva.

*56. **D. caryophyllus** L. Sp. pl. (1753) 410 (α **coronarius**); Overin and Sitovskii, Opyt russko-kavk. flory I (1858) 222; Williams in Journ. Linn. Soc. XXIX (1893) 432. — **D. coronarius** Lam. Fl. Franc. ed. 1, II (1778) 536. — Ic.: Rchb. Ic. Fl. Germ. VI, tab. 268, f. 5051. Russian: Gvozdika sadovaya or gllandskaya [Garden or Dutch carnation].

Perennial, more or less pruinose; stems 20–60 (90) cm long, simple or branched above, glabrous; leaves linear-lanceolate, acute, the margin smooth or at base ciliate; flowers simple or double, solitary or in clusters at tips of branches; calyx cylindric, 20–30 mm long; epicalyx scales 4–6, broad-ovate, abruptly mucronate, herbaceous, appressed to calyx, covering

one-fifth to one-quarter the length of calyx tube; petals large, triangular-ovate, toothed at summit, various shades of red.

Not growing wild in the USSR but, being a favorite ornamental plant, it is widely cultivated. — **Gen. distr.:** S. W. Europe (France, Spain, Italy, Dalmatia). Described from garden specimens. Type in London?

Note. The plant has been long in cultivation both in the open and under cover. It appears in many forms that vary in color, degree of doubleness, etc., often of hybrid origin. It is winter-hardy, but the better forms are potted and kept through the winter in greenhouses. The plant is propagated by seed and cuttings.

848

Section 3. **PLUMARIA** (Opiz) Asch. et Graebn. Sypons. V, 2 (1921) 408. — *Gen. Plumaria* Opiz, Seznam (1852) 75. — *Fimbriati* Boiss. Fl. Or. I (1867) 480. — *Fimbriatum* Williams in Journ. of Bot. XXIII (1885) 343; in Journ. Linn. Soc. XXIX (1893) 390. — Petal-limb glabrous or bearded at base, fringed to the middle or beyond, very rarely dissected to one-quarter into linear segments. Perennials.

Series 1. **Libanotides** Schischk. — Flowers 2 or 3 in compact capitate clusters; epicalyx scales with patulous or recurved lance-subulate sharp-pointed cusp.

57. **D. libanotis** Lab. Ic. Pl. Syr. Dec. I (1791) 41; Boiss. Fl. Or. I, 492; Grossg., Fl. Kavk. II, 428. — Ic.: Lindl. Bot. Reg. tab. 1548; Lab., l. c., tab. IV.

Perennial; stem erect, 25–60 cm long, 3–5 mm thick, nodulose, simple or branched; leaves linear-lanceolate, 4–7 cm long and 3–7 mm broad, glaucous, 5-veined, the basal subobtusate, the cauline acute, often arch-recurved, connate at base into sheath 2–4 mm long; flowers at tips of stems and branches 2 or 3 together, rarely solitary; calyx oblong-cylindric, 30–40 cm long; teeth lanceolate, acute; epicalyx scales 4–6, ovate at base, tapering to a patulous or recurved lance-subulate sharp-pointed cusp; petals whitish; limb short-hairy on the upper surface, with a red spot at base, fringed to the middle, with setiform segments. June–July.

Stony slopes. — Caucasus: S. Transc. **Gen. distr.:** As. Min., Arm.-Kurd., Iran. Described from Livan Range. Type in Paris.

Series 2. **Arenarii** Schischk. — Petals white, very rarely roseate, the undissected portion of the limb rather large and almost elliptic in outline.

58. **D. arenarius** L. Sp. pl. (1753) 413; Ldb. Fl. Ross. I, 284; Shmal'g., Fl. I, 129; Shishkin in Fl. Yugo-Vost. IV, 306; Grossg., Fl. Kavk. II, 428. — *D. plumarius* Ldb., l. c., I, 285, non L.; Shmal'g., l. c., non L. — *D. arenarius* ssp. *borussicus*, glaucous, *pseudosquarrosus* Kleop. in Bull. du Jard. bot. de Kieff XII–XIII (1931), 34, 35. — *D. uniflorus* Gilib. Fl. Lith. V (1785–87) 102. — Ic.: Rchb. Ic. Fl. Germ. VI, tab. 256, fig. 5026; Syreishch., Fl. Mosk. gub. II, 113. — Exs.: HFR no. 507; Pl. Finl. exs. no. 202.

Perennial, rather densely tufted, with nonelongated sterile densely leafy basal shoots; flowering stems erect or ascending, 10–30 cm long,

849 simple or sometimes branched above, glabrous, glaucescent (var. *borussicus* Vierh.) or green; leaves of sterile shoots linear to lance-linear, 1.5–3.5 cm long and 1–2 mm broad, erect or falcately recurved (var. *pseudosquarrosus* Novak), scabrous beneath; cauline leaves to 2 cm long, connate at base into sheath 1–2 mm long; flowers fragrant, solitary or several (var. *multiflorus* Kryl.); calyx cylindric, 18–20 (23) mm long, with acuminate teeth; epicalyx scales 4, ovate, mucronate, covering one-quarter of calyx; petals white, rarely roseate; limb deeply fringed, with linear-filiform segments, the upper surface hairy, with a greenish spot and purple dots. June–August.

Sandy meadows, and pine woods on sands. — European part: Kar.-Lap., U. Dnp., M. Dnp., Bl., U. V., V.-Kama, Transv.; Caucasus: Cisc. Gen. distr.: Scand., Centr. Eur. Described from the sands of Europe. Type in London.

59. *D. acicularis* Fisch. ex Ldb. Fl. Ross. I (1842) 284; Korsh. Tent. Fl. Ross. orient. (1898) 62; Shishkin in Fl. Yugo-Vost. IV, 307; Kryl., Fl. Zap. Sib. V, 1099. — Exs.: HFR no. 2651a.

Perennial, densely tufted; stems numerous, 12–30 cm long, simple or slightly branched above, erect, glabrous; leaves acicular, 2–6 cm long and 0.33–1 mm broad, usually conduplicate, subtriquetrous, acute; flowers fragrant, solitary or 2 or 3 together; calyx cylindric, 20–25 mm long and 3–5 mm broad; teeth lanceolate, acute; epicalyx scales 4–6, obovate, short-acuminate, covering one-quarter of calyx; petals white; limb oblong-elliptic or obovate, 1.2–1.5 cm long, hairy on the upper surface, lacinate to one-third, the segments linear; capsule cylindric, about equaling calyx; seeds ca. 2 mm long and 1.25 mm broad. June–August. (Plate LIV, Figure 3).

Rocks, stony slopes, and pine woods on sands. — European part: V.-Kama, V.-Don (Zhiguli), Transv.; W. Siberia: Ob, U. Tob., Irt. Endemic. Described from Ural. Type in Leningrad.

Note. The plant often forms attractive dense thickets on rocks; it may be recommended for ornamental use. The flowers are fragrant.

60. *D. squarrosus* M. B. Fl. taur.-cauc. I (1808) 331; Ldb. Fl. Ross. I, 284; Novak in Fedde, Repert. sp. nov. XXVII (1929) 383; Shishkin in Fl. Yugo-Vost. IV, 307. — *D. plumarius* b. *squarrosus* Schmalh. Fl. I (1895) 129. — Ic.: M. B. Cent. Pl. rar. I, tab. 33; Fl. Yugo-Vost. IV, fig. 323.

850 Perennial; stems profusely branched from base, 15–25 cm long, glabrous; leaves linear, 1.5–2 cm long and 0.5–1 mm broad, stiff, subulate-tipped, channeled, arched-recurved, with scabrous-denticulate margin, or else 1–1.5 mm broad, little recurved (var. *ucrainicus* (Kleop.) Schischk.); flowers solitary at tips of stems and branches; calyx cylindric, 22–30 mm long; epicalyx scales 4, ovate, short-acuminate, covering one-fourth of calyx; petals white, sparsely hairy on the upper surface, dissected into filiform segments 5–8 mm long, the oblong undissected portion 2–4 mm broad. June–July.

Sands in the steppe belt. — European part: M. Dnp., Bl., L. Don, Transv. (?), L. V. Endemic. Described from Sarepta district (Krasnoarmeisk). Type in Leningrad.

Series 3. **Criniti** Schischk. — Flowers purple, red, or white, their limb usually dissected nearly to base; epicalyx scales 4–8, mostly abruptly terminating in a subulate awn.

61. **D. crinitus** Sm. Act. Soc. Linn. Lond. II (1794) 300; Ldb. Fl. Ross. I, 283; Boiss. Fl. Or. I, 496; Shishk. in Fl. Tiflisa I, 209; Grossg., Fl. Kavk. II, 428.

Perennial; stems several, woody at base, 20–40 cm long, glabrous or scabrid-pubescent; leaves linear, 2–6.5 cm long and 1–1.5 mm broad, acute, 3–5-veined, glabrous or scabrous, connate at base into sheath 1–4 mm long; flowers solitary, terminal; calyx cylindric, 2.5–3 cm long; epicalyx scales 4–6, covering one-third of calyx tube, ovate, abruptly long-awned, sometimes equal to but mostly shorter than calyx; petals white or roseate (var. *roseus* Schischk.); limb dissected to below the middle into numerous capillary segments. June–August. (Plate LIV, Figure 5).

Rocks, dry stony or clayey slopes, and high mountain steppes up to 2,500 m. — Caucasus: E. and S. Transc., Tal. **Gen. distr.**: As. Min., Arm.-Kurd., Iran. Described from Armenia. Type in Geneva.

62. **D. crossopetalus** Fenzl in Kotschy Pl. exs. Pers. bor. (nom. nud.); Grossg., Fl. Kavk. II (1930) 428. — *D. crinitus* γ *crossopetalus* Boiss. Fl. Or. I (1867) 496.

Perennial; taproot stout, usually vertical; stems several, ascending at base, 5–18 cm long, simple, glabrous; leaves narrowly linear, 3-veined, acute, 1.5–2.5 cm long and 1 mm broad, glabrous, the sheath 1 mm long; flowers terminal, solitary or rarely paired; calyx cylindric, 30–40 mm long and 3–4 mm broad; teeth lanceolate, acute; epicalyx scales coriaceous, ovate, abruptly terminating in a herbaceous awn the length of calyx, covering one-third to one-quarter of calyx; petals white; limb fringed, the undissected portion oblong. June.

Stony slopes. — Caucasus: S. Transc. **Gen. distr.**: Iran. Described from N. Iran (Teheran, Elburz). Type in Geneva.

851 *63. **D. recognitus** Schischk. sp. nova in Acta Inst. Bot. Ac. Sc. URSS Ser. 1, III (1936).

Perennial, densely tufted; stems numerous, ascending or erect, 15–30 cm long, simple, 1-flowered, terete or obscurely 4-angled, glabrous, glaucescent; leaves narrowly linear, 1.5–4.5 cm long and 0.5–1 mm broad, much shorter than internodes, acute, glabrous, scarcely asperous-margined, the length of sheath equaling leaf width; calyx tubular, 22–25 mm long, light green or violet-tinged; teeth lanceolate, obtusish to light green or violet-tinged; teeth lanceolate, obtusish to acute, the scarious margins minutely ciliate; epicalyx scales (2) 4–6, coriaceous, ovate, obtusish or mucronulate, scarious-margined, covering one-third of calyx tube; petals purple; limb obovate, fringed to one-quarter or one-third or deeply toothed, bearded on the upper surface, the undivided portion 8–10 mm long and 4–5 mm broad. June.

Rock crevices. Not found in the USSR but occurring in the adjoining parts of Turkey. Endemic. Described from Ardanuch and Tsri. Type in Leningrad.

64. **D. kuschakewiczii** Rgl. et Schmalh. in A. H. P. V (1887) 244; Williams in Journ. of Linn. Society XXIX (1893) 397.

Perennial; stems commonly numerous, 20–35 cm long, branched, glabrous and somewhat glaucescent; leaves narrowly linear, 2–8 cm long and 0.5–2 mm broad, acute, 1-veined, glabrous, the sheath ca. 1.5 mm long; flowers solitary at ends of stems and branches; calyx cylindric, 25–35 mm long and 3–3.5 mm broad; teeth lanceolate, acuminate, narrowly scarious-margined; epicalyx scales 4, coriaceous, ovate, membranous-margined, usually abruptly terminating in awn twice the length of calyx, covering one-third to half the calyx tube; petals whitish or pale rose; limb fringed to the middle, with filiform segments. July–October.

Stony and dry clayey slopes, pebbled, and riparian sands. — Centr. Asia: T. Sh., Pam.-Al. (Irkeshtam, Karakuldzha, Gulcha, Yassa, Oital, Taldyk).

Gen. distr.: Dzu.-Kash. Described from Kastek pass. Type in Leningrad.

65. **D. tianschanicus** Schischk. sp. nova in Addenda V, p. 685.

Perennial; taproot stout, multicipital; stems numerous, scarcely ascending at base, then erect, 15–25 cm long, usually branched above, with numerous obliquely ascending branches, rarely simple, glabrous; leaves narrowly linear, 2–3.5 cm long and 0.5–1 mm broad, acute, 1-veined, obliquely ascending, the sheath 0.5–1 mm long; flowers 1–3, rarely more on the stem; calyx cylindric, 18 mm long; teeth lanceolate, acuminate, narrowly scarious-margined; epicalyx scales coriaceous, ovate, abruptly terminating in herbaceous awn, covering one-third of calyx; petals pink or dark purple; limb oblong, fringed-dissected into numerous narrowly linear segments; capsule equaling calyx; seeds flat, 3 mm long and 1.5 mm broad. July.

Sandy and pebbly riverbanks and stony mountain slopes, at altitudes between 2,000 and 2,500 m. — Centr. Asia: T. Sh. Endemic. Described from Tekes valley. Type in Leningrad; cotype in Alma-Ata.

66. **D. seravschanicus** Schischk. sp. nova in Addenda V, p. 686.

Perennial, woody at base; stem numerous, erect, 35–50 cm long, glaucescent, with obliquely ascending branches from the middle or higher up, minutely scaberulous below, smooth above; leaves linear, 2.5–5 cm long and 1–3 mm broad, acuminate, 3-veined, glabrous, the sheath 1–3 mm long; flowers 2 or 3 at ends of branches, rarely solitary, borne on very short pedicels, forming a paniculate inflorescence; calyx cylindric, attenuate toward summit, 15–20 mm long and 2.5 mm broad, with acuminate teeth; epicalyx scales 6–8 (rarely 4), ovate, abruptly mucronulate, covering one-third to half the calyx tube; petals whitish (?), the limb fringed. July–August.

Desert slopes, at altitudes of about 1,500 m. — Centr. Asia: Pam.-Al. (Kshtüt, Gissar Range), T. Sh. (Kara-Tau Range). Endemic. Described from Kshtut village. Type in Leningrad.

67. **D. karataviensis** N. Pavl. in Sched. ad Herb. Inst. Bot. Ac. Sc. URSS, nom. nud., descr. in Addenda V, p. 686.

Perennial; stems several, ascending at base, 20–35 cm long, branched, glabrous or in lower part scabrous; leaves linear, 2–4 cm long and 1–2.5 mm broad, those of sterile shoots scabrous, the cauline usually glabrous; flowers

solitary or in pairs at ends of stems and branches, forming a loose inflorescence; calyx oblong-cylindric, somewhat attenuate at summit, 12.5–16 mm long, glabrous; leaves ovate-lanceolate, acutish, scarcely scabrous on the back, the narrowly scarious margin sparingly ciliate; epicalyx scales 4–6 (8), coriaceous, ovate, scarious-margined, ciliate, short-acuminate or acute, covering one-third to half the calyx; petals rose-purple; limb oblong, fringed-dissected to the middle into linear segments, glabrous on the upper surface. June–September.

Stony and dry steppe slopes. — Centr. Asia: W. T. Sh. (Kara-Tau, Talas Ala-Tau, Chimgan, Pskem, Angren River). Endemic. Described from Kara-Tau Range. Type in Moscow; cotype in Leningrad.

Series 4. **Turkestanici** Schischk. — Flowers purple, red, pink, or white; epicalyx scales 4, acute or mucronulate.

68. **D. soongoricus** Schischk. sp. nova in Addenda V, p. 687. — *D. crinitus* Kryl., Fl. Zap. Sib. V (1931) 110, non Sm.

Perennial; stems usually numerous, 10–30 cm long, tuft-forming, simple or branched above, glabrous or in lower part scaberulous; leaves narrowly linear, 1–3 cm long and 0.5–1 mm broad, acute, keeled beneath; flowers solitary at ends of stems and 2 or 3 branches; calyx cylindric, (20) 25–32 mm long and 3–4 mm broad; teeth lanceolate, acute; epicalyx scales 4, oblong-elliptic, scarious-margined, mostly gradually acuminate, rarely abruptly mucronulate, covering one-quarter to one-third of calyx; petals dark red, rarely white (?), often turning brown on drying; limb 10 mm long, fringed-dissected almost to base into filiform segments; capsule cylindric, about equaling calyx; seeds elliptic, 3 mm long and 1.5 mm broad, with a broad thin margin. June–beginning of July.

Sandy and pebbly semideserts and stony slopes. — Centr. Asia: Balkh. (E. part), Dzu.-Tarb. **Gen. distr.:** Dzu.-Kash. Described from Zaisan district. Type in Leningrad.

69. **D. turcomanicus** Schischk. sp. nova in Addenda V, p. 687. — *D. pulverulentus* Freyn.

Perennial, woody at base; stems numerous, 20–50 cm long, sparingly scabrid-pubescent or glabrate, glaucescent, simple or branched; leaves linear, 1–6 cm long and 1–2 mm broad, acute, 3-veined, the lower minutely scabrid-puberulent, the upper glabrous; flowers solitary at ends of stems and few obliquely ascending branches; calyx tubular, 25–32 mm long and 4–5 mm broad, slightly attenuate at summit; teeth lanceolate, acuminate, narrowly scarious-margined; teeth sparingly ciliate, 8–10 mm long; epicalyx scales 4, rarely 6, acute or short-acuminate, scarious-margined, covering one-third of calyx; petals whitish-pink; limb ovate, fringed-dissected to below the middle, glabrous, the ovate undissected portion 7 mm long and 2–3 mm broad. May–July.

Stony slopes, rocks, and taluses, at altitudes up to 2,100 m. — Centr. Asia: Mtn. Turkm. (Kopet Dag). Endemic. Described from Kheirabad. Type in Leningrad.

Note. Differs from *D. pulverulentus* Stapf in the calyx sometimes being scabrous, and epicalyx scales covering but one-quarter to one-third

of the calyx and not reaching its middle. The characteristics distinguishing this species from *D. tabrisianus* are the large calyx as well as the growth habit.

70. *D. tetralepis* Nevski sp. nova in Addenda V, p. 687.

Perennial; stems numerous, erect or at base, ascending, 20–50 cm long, glabrous, simple or with obliquely ascending branches; leaves linear, 2–5 cm long and 1–2 mm broad, acute, glabrous; flowers solitary at tips of stems and branches; calyx tubular, 20–30 mm long and 3–4 mm broad; teeth lanceolate, acute or acuminate, ca. 8 mm long; epicalyx scales, 4, very rarely 2 or 6, ovate, narrowly scarious-margined, acuminate but not distinctly subulate-tipped, covering one-third of the calyx; petals dingy-pink; limb obovate or oblong, fringed-dissected to one-third or lower down, glabrous, the undissected portion 5–10 mm long and 3–5 mm broad. May–June.

Stony slopes, riverine pebbles, turfy sands, and loams. — Centr. Asia: Pam.-Al., W. T. Sh. Endemic. Described from Kugitang. Type in Leningrad.

Series 5. **Orientales** Schischk. — Epicalyx scales 4–8; leaves narrowly linear.

71. *D. orientalis* Adams in Web. et Mohr, Beitr. I (1805) 54; Donn, Hort. Cantabr. éd. IV (1807) 101; Sims. Bot. Mag. XXVII (1807) tab. 1069; Shishkin in Fl. Tifl. I, 427; Grossg., Fl. Kavk. II, 427. — *D. fimbriatus* M. B. Fl. taur.-cauc. I (1808) 332, 428; III, 302; Ldb. Fl. Ross. I, 283; Boiss. Fl. Or. I, 495, ex parte. — *D. contortus* Rees, Cyclop. XI (1819) sine pagina. — Ic.: Sims., l. c., tab. 1069; Grossg., Sosn. and Shishk., Fl. Tifl., Fig. 87.

Perennial; stems woody at base, profusely branched; herbaceous stems 10–30 cm long, glabrous or in lower part scabrous as are the leaves; leaves linear-subulate, 3–5 cm long and 0.5–1 mm broad, acute, asperous-margined, the sheath 1–2 mm long; flowers solitary, terminal; calyx 20–25 mm long, with acute teeth; epicalyx scales 6–8, ovate, acute, only occasionally mucronulate; petals rosy-red, the limb deeply fringed. June–July.

Rocks. — Caucasus: E. and S. Transc. **Gen. distr.:** Arm.-Kurd., Iran., As. Min. Described from the vicinity of Tbilisi. Type in Moscow?

72. *D. canescens* C. Koch in Linnaea XV (1841) 710; Grossg., Fl. Kavk. II, 432. — *D. fimbriatus* § *canescens* Boiss. Fl. Or. I (1867) 496.

Perennial; taproot vertical or ascending, ca. 3 mm thick; stems numerous, erect or at the very base ascending, 18–23 cm long, 4-angled, simple or branched, densely scabrous-pubescent in lower part, glabrate above; leaves stiff, narrowly linear, (1)2–3 cm long and ca. 1 mm broad, slender-pointed, scabrous-pubescent to subglabrous, the sheath 1–1.5 mm long; flowers solitary at ends of stems and few obliquely ascending branches; calyx cylindric, 25–28 mm long, light green; teeth lanceolate, acute or mucronulate, broadly scarious-margined, with sparingly ciliate teeth; epicalyx scales 4–6, coriaceous, ovate, acute, with broad white scarious margin, covering one-third of calyx tube; petals lurid or reddish-

yellow; limb obovate-cuneate, 4 mm long and 3 mm broad, glabrous or sparsely and minutely hairy on the upper surface, fringed to one-quarter or one-third. June.

Stony semideserts. — Caucasus: S. Transc. (Echmiadzin, Arazdayan). Endemic. Described from Echmiadzin. Type in Berlin.

73. *D. tabrisianus* Bienert ex Boiss. Fl. Or. I (1867) 496; Grossg., Fl. Kavk. II, 429, ex parte.

Perennial, woody at base; stems numerous, 15–40 cm long, minutely puberulent or glabrate in lower part, simple or slightly branched, the branches obliquely ascending; basal leaves linear, to 5 cm long and 1 mm broad, acute, asperous-margined, the cauline similar but smaller; calyx 15–20 mm long, with acute teeth; epicalyx scales 4–6, ovate-oblong, broadly scarious-margined, mucronate, covering one-third of calyx; petals rose-purple or white; limb ovate-oblong, ca. 5 mm long, toothed-incised to one-third. July.

Dry slopes. — Caucasus: S. Transc. **Gen. distr.:** Iran. Described from Tavriz district. Type in Geneva; cotype in Leningrad.

74. *D. macronyx* Fenzl in Kotschy, Pl. Pers. bor. (1846) nom. nud. ex Boiss. Fl. Or. I (1867) 495. — *D. fimbriatus* ϵ *stenocalyx* Boiss., l. c., (1867). — Exs.: Sintenis Iter transcasp.-pers. 1900–1901, no. 1082.

856 Perennial, woody at base and almost suffrutescent, much branched; herbaceous stems numerous, erect, 15–40 cm long and 1–1.3 mm thick, simple or branched, green, glabrous or in lower part very slightly scabrid; leaves linear-subulate, 1.5–3.5 cm long and 0.5–1 mm broad, acute, glabrous; flowers solitary at ends of stems and branches; calyx cylindric, 18–24 mm long and 2–3 mm broad; teeth lanceolate, acuminate, scarious-margined; epicalyx scales 6, narrow-ovate, acute or acuminate, scarious-margined, covering half or more of calyx tube; petals pink, shorter to very slightly longer than calyx; limb oblong, 4–8 mm long and 2–4 mm broad, fringed to one-third, hairy on upper surface. July–August.

Rocks and stony slopes. — Centr. Asia: Mtn. Turkm. (Kopet Dagh). **Gen. distr.:** Iran. Described from Elburz, Shirder Pass (N. Iran). Type in Leningrad.

Series 6. *Superbi* Schischk. — Leaves lance-linear or lanceolate, 4–10 mm broad.

75. *D. superbus* L. Fl. suec. ed. 2 (1755) 146; Amoen Acad. IV (1759) 272; Ser. in DC. Prodr. I, 360; Ldb. Fl. Ross. I, 285; Turcz. Fl. baic.-dahur. I, 197; Shmal'g., Fl. I, 129; Kryl., Fl. Zap. Sib. V, 1100. — *D. superbus* var. *eurycalyx* Trautv. ex Juzepczuk, Beitrag zur Flora des Polessje in Zap. Belorussk. Gosud. Inst. Sel'sk. i lesn. khoz. IV (1925) 212.

Perennial; rootstock stringlike, 1–2 mm thick, creeping, giving rise to flowering stems and nonelongated sterile shoots; stems solitary to several, ascending at base, 15–60 cm long, glabrous, simple or mostly sparsely branched above; leaves linear-lanceolate to linear, 4–8.5 cm long and 2–8.5 mm broad, asperous-margined, acute or the lower obtusish, 3–5-veined; flowers 1–9 on the stem, fragrant, on pedicels 2 cm long;



PLATE LIV. 1. *Dianthus stenocalyx* (Trautv.) Juz.— 2. *D. cyri* Fisch. et Mey.— 3. *D. acicularis* Fisch.— 4. *D. superbus* L.— 5. *D. crinitus* Sm.

calyx cylindric, 15–23 mm long and 4–5 mm broad, violet-tinged, scarcely attenuate toward summit; teeth lanceolate, acute, 4–5 mm long; petals pink, rose-purple or purple (var. *rubicundus* Ser.); limb bearded and green-spotted at base, fringed-dissected into filiform-linear segments 3–4 times as long as the width of the oblong undissected portion; capsule slightly exceeding calyx; seeds elliptic, 2.5 mm long and 1.5 mm broad. June–July. (Plate LIV, Figure 4).

Dry and water meadows, wood margins, and open woods, rising in the mountains above the timber line. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. Dnp., M. Dnp., V.-Kama; W. Siberia: all regions; E. Siberia: all regions; Far East: all regions; Centr. Asia: Dzu.-Tarb. (only Saur and Tarbagatai). **Gen. distr.:** Scand., Centr. Eur., Mong. Described from Lapland. Type in London.

859 76. **D. hoeltzeri** Winkl. in Rgl. Gartenfl. (1881) 1, tab. 1032, fig. 2.

Perennial; rootstock stringlike, creeping, giving rise to flowering stems and nonelongated sterile shoots; stems solitary to several, ascending at base, 15–60 cm long, usually branched above; leaves linear-lanceolate, 4–6 cm long and 2–4 mm broad, acute, scarcely roughened on the margin, the sheath 2–4 mm long; flowers 2–4 on the stem or solitary; calyx cylindric, 23–25 mm long and 4–5 mm broad, slightly attenuate and commonly violet-tinged at summit; teeth lanceolate, acute, ciliate-margined; epicalyx scales 4, rarely 5, covering one-quarter to one-third of calyx, ovate or broad-ovate, narrowly scarious-margined at apex, truncate, mucronate or notched with a mucro in the notch, very rarely muticous (var. *subobtusus* Preobr.); petals dark rose, one and a half times to twice as long as calyx; limb deeply fringed-dissected, the obovate or broad-ovate or rarely oblong undissected portion hairy, the claw usually greatly exceeding or rarely equal to calyx. June–September.

Spruce and fir forests, and mixed alpine or subalpine grassland. — Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** Dzu.-Kash. Described from specimens from seed collected by Regel in Turkestan. Type in Leningrad.

77. **D. stenocalyx** (Trautv.) Juzepczuk, Beitrag zur Flora des Polessje in Zap. Belorussk. Gosud. Inst. Sel'sk. i lesn. khoz. IV, (1925) 212. — *D. elegans* M. B. ex Rupr. Fl. Cauc. (1869) 174 in Observ., non Urv. (1822). — *D. superbus* var. *stenocalyx* Trautv. ex Juz., l. c. (1925); Shishkin in Fl. Yugo-Vost. IV, 308. — *D. superbus* ssp. *stenocalyx* Kleop. in Bull. du Jard. Bot. de Kieff XII–XIII (1931) 39–40. — Exs.: HFR no. 506.

Perennial; stems solitary to several, 40–90 cm long, branched above, glabrous; leaves linear-lanceolate, 6–9 cm long and 2–6 mm broad, acute, scarcely roughened on the margin, the sheath 2–4 mm long; flowers 6–10, on rather long pedicels; calyx cylindric, 20–25 mm long and 3 mm broad, pale green or faintly purple-tinged, markedly attenuate toward summit; teeth lanceolate, acute; epicalyx scales 4, ovate; petals fringed, one and a half times as long as calyx, light rose, often almost white. June–August. (Plate LIV, Figure 1).

Open deciduous woods and their margins, pine woods, and inundated, sometimes saline meadows. — European part: U. Don, U. Dnp., M. Dnp., Bl., L. Don, V.-Kama (Kazan), L. V. Endemic. Described from S. part of RSFSR and Ukraine. Type in Leningrad.

Note. The northern limit of the distribution area of this species has not yet been definitely established; it coincides apparently with the northern limit of the forest belt.

Section 4. **VERRUCULOSI** Boiss. Fl. Or. I (1867) 469. — Subgenus *Proliferastrum* Williams in Journ. Linn. Soc. XXIX (1893) 463, ex parte. — Calyx finely tuberculate; epicalyx scales 4; lower leaves soon wilting.

78. **D. cyri** Fisch. et Mey. Ind. IV sem. Horti Petropol. (1838) 34; Ldb. Fl. Ross. I, 280; Boiss. Fl. Or. I, 482; Grossg., Fl. Kavk. II, 427. — *D. macrolepis* Boiss. Diagn. sér. I, 1 (1842) 18. — Exs.: Fl. Cauc. no. 26.

Annual; stem 12–30 cm long, erect, branched, glabrous; leaves linear-lanceolate, 2–5 cm long and 2–4 mm broad, 3-veined, scabrous or antrorsely ciliate on the margin, connate at base into a short sheath; flowers solitary at ends of stem and branches; calyx narrow-ovate, ca. 15 mm long and 5–6 mm broad, finely tuberculate; teeth lanceolate, slender-pointed; epicalyx scales scarcely divergent, abruptly narrowed from a broad-ovate base to a scabrous awn longer than the dilated portion; petals lilac; limb oblong, 4–5 mm long, glabrous on the upper surface, incised-toothed at summit; capsule shorter than calyx. June. (Plate LIV, Figure 2).

Dry and sandy steppe meadows, canal banks, and occasionally among crops. — Caucasus: W., E., and S. Transc. **Gen. distr.:** Arm.-Kurd., As. Min., Iran., Egypt. Described from the Kura River valley near Mingechaur. Type in Leningrad.

D. deltoides L. × *D. superbus* L. (*D. jaczonis* Aschers. in Oester. bot. Zeitscher. XXVI (1876) 255, 257).

Perennial; stem ascending at base, 20–30 cm long, simple, slightly scabrid-pubescent; leaves lance-linear, 3–4 cm long and 2.5–3 mm broad, acutish, asperous-margined; flowers solitary to several, terminal; calyx cylindric, 16–18 mm long, light green; teeth lanceolate, acute; epicalyx scales 2–4, broad-ovate, acute or mucronate, covering one-quarter to one-third of calyx; petals pink, about twice as long as calyx; limb obpyramidal, fringed nearly to the middle. June–July.

Mixed grassland. — European part: Dv.-Pech. (Luza River banks near Khlyndino village). **Gen. distr.:** Scand. (Sweden), Centr. Eur. (Brandenburg, Bavaria). Described from Köpenick district.

D. armeria × *D. deltoides* Rchb. Deutsch. Fl. III (1842–43) 148. — *D. helwigii* Aschers. apud. Borbas in Vjalb. Jeten. Magyar (1875). — *D. deltoides* × *armeria* Zapal. Consp. Fl. Galic. crit. III (1911) 147. — Ic.: Rchb. Ic. Fl. Germ. VI, tab. 263, f. 5040 b.

Annual or perennial (?); stem erect, branched, 35–70 cm long, glabrate in lower part, puberulent above; leaves linear, 4–7 cm long and 1–4 mm broad, scabrid-pubescent or the lower glabrate, the sheath 2–4 mm long; flowers solitary or in 2's or 3's at ends of branches, forming a loose panicle inflorescence; calyx tubular, 18–20 mm long and ca. 3 mm broad, scabrid-pubescent at summit; teeth lanceolate, acuminate; epicalyx scales 4, herbaceous, ovate, terminating in awn that reaches the middle of

calyx tube or the calyx teeth; petals rose-lilac; limb obovate, 4–5 mm long and 3–4 mm broad, bearded. July – August.

Deciduous woods. – M. Dnp. (former Chernigov Province, Osterov Pass).
Gen. distr.: Centr. Eur. Described from Germany.

D. barbatus L. × *D. superbus* L. – *D. courtoisii* Rchb. Fl. Germ. ex curs. (1832) 806. – *D. barbato-superbus* Lejeune ex Rchb., l. c. – *D. leitgebii* Reichardt in Verh. Zool. Bot. Ges. Wien XXIII (1873), 561. – Ic.: Rchb. Ic. Fl. Cerm. VI, t. 252.

Perennial; stem 30–50 cm long, subterete to 4-angled, branched in inflorescence, glabrous; leaves lanceolate to linear-lanceolate, 5–8 cm long, acute, asperous-margined, petiolate, the sheath 2–6 mm long; flowers in a subcorymbose terminal inflorescence; calyx tubular, 18–21 mm long and 4 mm broad, pale green, scarcely violet-tinged at summit; teeth acuminate; epicalyx scales 4, coriaceous, ovate, abruptly terminating in a subulate point half the length of calyx, covering one-third to half of calyx tube; petals various shades of pink; limb broad-obovate, 10–15 mm long and 8–12 mm broad, often fringed to one-fifth or one-third. July.

Parks and inhabited areas. – U. V. (Buiscoye and Rybinsk districts).
Gen. distr.: Centr. Eur. Described from Belgium.

Genus 499. **SAPONARIA*** L.**

L. Sp. pl. (1753) 408. – Bootia Neck. Delil. Gallobelg. I (1768) 93. – *Proteinia* Rchb. Nom. (1841) 205. – *Spanizium* Griseb. Spicil. I (1843) 180.

862 Flowers perfect, in a loose corymbose-paniculate inflorescence; calyx tubular or cylindric, scarcely inflated, with 5 mostly point-tipped teeth; petals 5, with a long linear claw, coronate; limb entire, obscurely emarginate or 2-lobed; stamens 10; styles 2, rarely 5; capsule cylindric or oblong or obovoid, unilocular, dehiscing by 4 teeth; seeds reniform, finely tuberculate or rugose, compressed, with lateral hilum. Perennial or annual plants, glabrous or pubescent; leaves broadly lanceolate, linear-lanceolate, oval, spatulate or oblong, obtuse or acute, sessile or petiolate, opposite, entire.

1. Calyx 15–24 mm long; petals one and a half times as long as calyx; cauline leaves ovate-oval, oval-lanceolate or elliptic, 10–40 mm broad. 2.
- + Calyx 5–14 mm long; petals slightly exceeding calyx; cauline leaves lanceolate, oblong-ovate, spatulate, oval, oblong-linear or ovate, 2–10 mm broad. 3.
2. Petals red, with linear-cuneate 2-lobed limb; plant glandular-pubescent throughout 1. *S. glutinosa* M. B.
- + Petals white or roseate, with oblong-obovate emarginate or sometimes entire limb 2. *S. officinalis* L.
3. Perennials; stem and leaves glabrous 4.
- + Annuals or biennials; stem pubescent 5.
4. Plant glabrous throughout; stem 60–65 cm long; calyx cyathiform-cylindric, 6–8 mm long; petals white or pale rose, slightly exceeding calyx 3. *S. griffithiana* Boiss.

* From Greek *sap on*, soap; the roots of some species being used as a soap substitute.

** Treatment by S. G. Gorshkova.

- + Pedicel and calyx glandular-pubescent; stem 7–30 cm long; calyx cylindric, 8–11 mm long; petals pink, about twice as long as calyx 4. *S. sewerzowii* Rgl. et Schmalh.
- 5. Ovary and capsule distinctly stipitate; fruiting calyx strongly inflated, to 7 mm broad; pedicels one-fifth to half length of calyx 5. *S. prostrata* Willd.
- + Ovary and capsule sessile or subsessile; fruiting calyx not much inflated, to 4 mm broad; pedicels slightly shorter to longer than calyx 6.
- 6. Calyx 5–7 mm long; petal-limb entire or obscurely emarginate; leaves 3–9 mm broad 7.
- + Calyx 7–12 mm long; petal-limb semibifid; leaves 2–3 mm broad .. 8.
- 7. Plant densely covered with simple hairs; stem 2.5–8 cm long; calyx teeth ovate-triangular, acute 6. *S. parvula* Bge.
- + Stem and calyx glandular-pubescent; leaves glabrous; stem 10–30 cm long; calyx teeth ovate, obtusish 7. *S. cerastoides* Fisch. et Mey.
- 8. Plant densely villous-glandular throughout; leaves lanceolate, 1-veined, obtuse; inflorescence densely corymbose; calyx cylindric, slightly attenuate at summit 8. *S. viscosa* C. A. M.
- + Upper part of stem and calyx densely glandular-pubescent; leaves glabrous, 3-veined, the basal oblong-lanceolate obtuse, the cauline linear acute; inflorescence loosely corymbose; calyx short-cylindric 9. *S. orientalis* L.

1. *S. glutinosa* M. B. Fl. taur.-cauc. I (1808) 322; Ldb. Fl. Ross. I, 301; Boiss. Fl. Or. I, 528; Shmal'g., Fl. I, 134; Grossg., Fl. Kavk. II, 434. — *Silene armeria* Pall. Tableau phys. et topogr. Tavr. (1795) 51, nom. nud. — Ic.: M. B. Cent. Pl. Rar. II (1843) tab. 66; Rchb. Ic. Fl. Germ. VI, tab. 243, f. 4994 b [*Bootia glutinosa* (M. B.)]. — Exs.: J. Bornmüller Fl. exs. Anatoliae or. no. 488; Fl. exs. Austr.-Hung. no. 1695; HFR no. 1759.

Biennial, glandular-villous; stem erect, paniculately branched in upper part, 30–70 cm long; leaves acute, 3-veined, the lower spatulate, petiolate, the upper ovate-oval, 2.5 cm long and 14–18 mm broad; inflorescence corymbose-paniculate; calyx cylindric, glandular-villous, 20–24 mm long and 3–4 mm broad; teeth lanceolate, acuminate, dark purple; petals red; limb linear-cuneate, 2-lobed, with a pair of subulate coronal scales; capsule cylindric, subsessile, shorter than calyx; seeds numerous, small, reniform, finely tuberculate. May–June.

Dry mountain slopes and mountain woods. — European part: Crim.; Caucasus: Cisc. Gen. distr.: Med., Bal.-As. Min. Described from the Crimea, Tenurdzhi. Type in Leningrad.

2. *S. officinalis* L. Sp. pl. (1753) 408; Ldb. Fl. Ross. I, 300–301; Boiss. Fl. Or. I, 524; Shmal'g., Fl. I, 133–134; Grossg., Fl. Kavk. II, 434; Kryl., Fl. Zap. Sib. V, 1106–1107. — *Bootia vulgaris* Neck. Delic. Gall. Belg. I (1768) 193. — *Lychnis officinalis* Scop. Fl. Carniol. I, 1 (1772) 303. — *Saponaria nervosa* Gilib. Fl. Lith. V (1781) 163. — *S. alluvionalis* Du Molin in O. B. Z. (1867) 390. — *Silene saponaria* Fries in Lindbl. Bot. Not. no. 10 (1842) 168. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 245, f. 4995;

Hegi, Fl. Mitt. Eur. III, 347, f. 597a—c et tab. 103, f. 4. — Exs.: Herb. Norm. ed. J. Dörfner, no. 5238; Pl. Hercegov. exs. no. 172; Hayek, Fl. stiriaca exs. no. 1147.

864 Perennial, glabrous (var. *glabriuscula* Schischk.) or scabrid-puberulous (var. *puberula* Siml.); stem erect, simple or in upper part branched, terete, 30–90 cm long; leaves oblong, oval-lanceolate or elliptic, 3-veined, acute, 5–12 cm long and 1–4 cm broad, with sharply scabrous margin, short-petioled; inflorescence loosely corymbose-paniculate; pedicels short; bracts linear-lanceolate; calyx cylindric, 15–18 mm long and 4–5 mm broad, puberulent; teeth unequal, ovate, mucronate from obtuse apex; petals white or roseate; limb oblong-obovate, emarginate or sometimes entire, with small coronal scales; capsule oblong-ovate; seeds numerous, small, reniform, finely tuberculate. June–August.

Coppices, woods, and river valleys. — European part: Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don; Caucasus: Cisc., W., E., and S. Transc.; W. Siberia: Irt., Alt. **Gen. distr.:** Centr. Eur., Med., Bal.-As. Min. Described from Europe. Type in London.

Economic importance. Often cultivated for ornament, occasionally becoming naturalized. The roots contain up to 35 percent saponin and are used as a substitute for soap.

3. *S. griffithiana* Boiss. Diagn. pl. or. nov. ser. II, 1 (1854) 70; Boiss. Fl. Or. I, 524. — *S. corrugata* Franchet in Ann. Sc. Nat. sér. VI, XV (1883) 237. — *S. silenoides* H. Winkl. in Vidensk. Medd. Kjobenh. (1901) 50. — Ic.: Franchet in Ann. Sc. Nat. ser. VI, XV (1883) tab. 12.

Perennial, glabrous, bluish-green; stem ascending to erect, to 60–65 cm long, terete, virgate, whitish, lustrous, dichotomously divaricately branched, densely leafy at base; leaves thick, scabrous-margined, the lower oblong and long-petioled, the upper oblong-linear, 2–4.5 cm long and 3–7 mm broad, acute, sessile, somewhat narrowing toward base; inflorescence a loosely few-flowered raceme; bracts lanceolate, ciliate-margined; pedicels erect, much longer than calyx; calyx green, subcoriaceous, scabrid-tuberculate or rugose, cyathiform-cylindric, 6–8 mm long and 2–3 mm broad, oblong in fruit, 15-ribbed; teeth triangular, acute; petals white or pale rose, slightly exceeding calyx, oblong to oblong-linear, gradually tapering to claw; limb entire; coronal scales 2-fid, setaceous; styles 2; capsule oblong, equaling or slightly exceeding calyx; seeds reniform, dark cinnamon, more or less compressed, finely tuberculate. June–July. (Plate LV, Figure 1).

Gullies, slopes, and taluses; occasionally a weed of field crops. — Centr. Asia: Pam.-Al. **Gen. distr.:** Iran. Described from Afghanistan. Type in Geneva.

Economic importance. The fleshy rootstock of *S. griffithiana* Boiss. is used as soap substitute.

867

4. *S. sewerzowii* Rgl. et Schmalh. in A. H. P. V (1877) 246.

Perennial, glabrous; stem simple, angled, dichotomously branched at base, 7–30 cm long; leaves lanceolate to oblong-lanceolate, 3-veined, acute, 1–3 cm long and 3–10 mm broad, subcordate at base, sessile, almost clasping at base, entire; inflorescence densely corymbose; pedicels erect,



PLATE LV. 1. *Saponaria griffithiana* Boiss.: petal.— 2. *S. sewerzowii* Rgl. et Schmalh.: flower.— 3. *S. cerastoides* Fisch.: flower.— 4. *S. viscosa* C. A. M.— 5. *Tunica stricta* (Bge.) Fisch. et Mey.— 6. *T. saxifraga* (L.) Scop.— 7. *Kohlrauschia prolifera* (L.) Kunth.— 8. *Vaccaria segetalis* (Neek) Garcke.

one-third to half the length of calyx, glandular-pubescent; bracts lanceolate; calyx cylindric, more or less suffused with violet, 8–11 mm long and 2 mm broad, densely glandular-pubescent, narrowly oblong in fruit; teeth oblong, obtuse; petals pink, about twice as long as calyx; limb cuneate or linear-oblong, rounded at summit, gradually tapering into narrow claw; capsule oblong, sessile, slightly shorter than calyx. April–May. (Plate LV, Figure 2).

Stony slopes. — Centr. Asia: Pam.-Al., Syr D. Endemic. Described from the Kharli-Tau foothills. Type in Leningrad.

5. *S. prostrata* Willd. Enum. plant. Hort. r. bot. Berol. (1809) 465; Boiss. Fl. Or. I, 529. — *Spanizium ocymoides* Griseb. Spicileg. I (1843) 180. — *Saponaria holopetala* Ldb. Fl. Ross. I (1842) 301; Grossg., Fl. Kavk. II, 434. — *S. atocioides* Boiss. Diagn. Pl. or. nov. sér. I, 1 (1842) 16. — *S. atocioides* var. *Calverti* Boiss. Diagn. Pl. or. nov. sér. II, 5 (1856) 50. — *Saponaria calverti* Boiss. in Huet. Pl. Arm. exs. — Exs.: Bornmüller: Bithyniae, Galatae, Pahlagoniae pl. exs. no. 13890; Pl. exs. Anatoliae or. no. 189.

Biennial, densely canescent, viscid; stem mostly slender, dichotomously branched from base, procumbent, 7–25 cm long; leaves oblong-linear, spatulate or ovate-orbicular, 1-veined, 1.5–2 cm long and 4–5 mm broad, long-petioled; flowers numerous, in dense corymbs; pedicels one-fifth to half the length of calyx; calyx cylindric, 12–14 mm long and 3–5 mm broad, glandular-pubescent, inflated in fruit and then to 7 mm broad, reticulately nerved; teeth triangular-ovate, acute; petals pink; limb oblong-spatulate, entire, one-fourth as long as calyx; coronal scales cleft, setaceous; ovary long-stipitate; capsule very small, globose, long-stipitate; seeds cinnamon, conspicuously tuberculate. May–June.

Stony slopes and taluses. — Caucasus: W., E., and S. Transc. **Gen. distr.:** E. Med., Bal.-As. Min., Arm.-Kurd. Described from Asia Minor, Galatia. Type in Berlin.

6. *S. parvula* Bge. in Arb. Naturf. Riga I (1847) 181; Boiss. Fl. Or. I, 531.

868 Annual or biennial, densely covered throughout with white hairs; stem 2.5–7.5 cm long, geniculately flexuous, with dichotomously radiating branches; leaves oblong-ovate, obtuse, fleshy, 14–21 mm long and 4–7 mm broad, obscurely 3-veined, short-petioled; flowers in a compact few-flowered cymose inflorescence or sometimes solitary; pedicels erect, as long as or shorter than calyx; calyx oblong-cylindric, 5–7 mm long, 2–3 mm broad, patulous-hairy; teeth ovate-triangular, acute, with narrow white scarious margin; petals white or roseate, linear-spatulate, obsoletely emarginate to subentire, slightly exceeding calyx; ovary short-stipitate, ovoid; capsule oblong-ovoid, stipitate; seeds small, rounded-reniform, cinnamon or dark brown, obscurely and minutely tuberculate. April–May.

Chalky slopes and takyrs. — Centr. Asia: Kyz. K. Endemic. Described from Kyzyl-Kum desert. Type in Leningrad.

7. *S. cerastoides* Fisch. in C. A. M. Verzeichn. Pflanz. Cauc. (1831) 212; Ldb. Fl. Ross. I, 302; Boiss. Fl. Or. I, 532; Grossg., Fl. Kavk. II, 434.

Annual; stems numerous, slender, dichotomously branched, sometimes decumbent, to 10–30 cm long, glandular-pubescent; leaves ovate, oval or

orbicular, 7–13 mm long and 3–9 mm broad, obtuse, glabrous, short-petioled; flowers in a loose inflorescence; pedicels erect, about as long as or slightly longer than calyx; calyx short-cylindric, 5–7 mm long and 2–3 mm broad, glandular-pubescent; teeth ovate, obtusish; petals pink, ecoronate, long-clawed; limb entire, slightly longer than calyx; capsule oblong, slightly exceeding calyx; seeds dark cinnamon, reniform, finely tuberculate. April–May. (Plate LV, Figure 3).

Dry slopes. — Caucasus: Dag., S. Transc., Tal. **Gen. distr.:** Iran. Described from Lenkoran district. Type in Leningrad.

8. *S. viscosa* C. A. M. Verzeichn. Pflanz. Cauc. (1831) 212; Ldb. Fl. Ross. I, 302; Grossg., Fl. Kavk. II, 435.

Annual, densely villous-glandular throughout; stem 4–14 cm long, erect, terete, dichotomously branched; leaves lanceolate, 10–14 mm long and 2–3 mm broad, sessile, obtuse, 1-veined; flowers in a dense corymbose inflorescence; bracts linear-lanceolate; pedicels erect, slightly shorter than calyx; calyx cylindric with acute teeth; petals pink, ecoronate, with elongated exerted claw; limb very small, semibifid; capsule oblong-ovaloid, scarcely exceeding calyx; seeds small, cinnamon, subglobose-reniform, finely tuberculate. May. (Plate LV, Figure 4).

Dry slopes. — Caucasus: S. Transc., Tal. **Gen. distr.:** Arm.-Kurd., Iran. Described from Talysh (Zuvant). Type in Leningrad.

39

9. *S. orientalis* L. Sp. pl. (1753) 409, Ldb. Fl. Ross. I, 301; Boiss. Fl. Or. I, 531; Grossg., Fl. Kavk. II, 435. — *Lychnis orientalis* Scop. Fl. Carn. ed. II, I (1772) 304, t. 1. — *S. orientalis* var. *communis* Trautv. (in schedis). — Ic.: Rchb. Ic. Fl. Germ. VI, tab. 244, f. 4994 (*Proteina orientalis* (L.) Ser.). — Cusin et Ansberque, Fl. Franc. IV (1869), tab. 6, fig. 18. — Exs.: J. Bornmüller Pl. Anatoliae or. no. 1800.

Annual; stem glandular-pubescent or glabrous (var. *glabrata* Trautv.), 5–10 cm long, divaricately branched; leaves 12–15 mm long and 2 mm broad, glabrous, the lower oblong-lanceolate, obtuse, the upper linear, acute, often reflexed at tips; flowers in a loose corymbose inflorescence; pedicels erect, about equal to calyx; calyx 7–10 mm long and 3–3.5 mm broad, short-cylindric, glandular-pubescent; teeth oblong-triangular, acute, with narrow white scarious margin; petals pink, ecoronate; limb very small, subcuneate, semibifid; capsule oblong-cylindric, about equaling calyx; seeds cinnamon, subglobose-reniform, finely tuberculate. May–August.

Dry stony plains, slopes, and hills. — Caucasus: Dag., E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm. (S. W. Kopet Dagh). **Gen. distr.:** Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from the Orient. Type in London.

Genus 500. **VELEZIA** * L.**

L. Sp. pl. I (1753) 332.

Calyx slenderly tubular, 5-toothed, 5–15-nerved; petals 5 or 10; styles 2. Herbaceous plants with branched stems and linear leaves.

* Named for the Madrid pharmacist Christobal Velez, a disciple of Minuart.

** Treatment by S. G. Gorshkova.

1. *V. rigida* L. Spec. pl. (1753) 332; Fenzl. in Ldb. Fl. Ross. I, 274; Boiss. Fl. Or., 478; Shmal'g., Fl. I, 122. — Ic.: Rchb. Ic. Fl. Germ. VI, t. 246, f. 5007. — Exs.: Herb. Fl. Cauc. no. 270; H. F. A. M. no. 475 a and 475 b.

870 Annual, glandular-pubescent; stems geniculately branched, to 50 cm long; leaves subulate, linear or narrowly linear, 7–12 mm long and 0.5–1 mm broad, acute, scabrous-margined; flowers solitary, subsessile, alternate or paired; pedicels thickened, one-sixth the length of calyx; calyx slenderly cylindric, 11–20 mm long and 1.5 mm broad, 15-nerved, with 5 elongate-subulate teeth; petals pink; limb 2-fid, the upper surface with few hairs at base; capsule cylindric, 4-toothed, shorter than calyx; seeds small, cylindric or ovoid, eccentric due to depression at the hilum. May–June. (Plate XLV, Figure 3).

Sandy, pebbly, stony and dry places, slopes, and hills. — European part: Crim.; Caucasus: Cisc., Dag., W., E., and S. Transc., Tal.; Centr. Asia: Balkh., Syr D., Pam.-Al., T. Sh., Mtn. Turkm. **Gen. distr.:** Med., Bal. As. Min., Iran. Described from S. Europe. Type in London.

DIAGNOSES PLANTARUM NOVARUM
IN TOMO VI FLORAE URSS COMMEMORATARUM
(DIAGNOSES OF NEW SPECIES MENTIONED IN VOLUME VI)

Novembri 1936.

CHENOPODIUM L.

1. *Ch. jennisiejense* Aellen et Iljin sp. nova.

Planta annua, 5—30 cm alta, caulibus prostratis, rarius suberectis; folia oblongo deltoidea vel ovali-deltoidea, trilobata, acuminata vel marginibus subparallelibus, superne 1—2-denticulata, lobis lateralibus dentiformibus ad medium laminae dispositis, utrinque viridia. Inflorescentia plus minusve densa, spiciformis; phylla perianthii membranacea, leviter carinata, sparsim farinosa; pericarpium brunnescens cum semine cohaerens; semina 1—1.25 mm diam., atrata, non manifeste picta.

Area geogr.: Europa et Sibiria subarctica.

Typus: Sibiria jennisiejensis; arenae et glareae in ostio fl. Kureika, 7 IX 1914 n° 4102, leg. N. Kusnezov et Reverdatto; in Herb. Inst. Bot. Ac. Sc. URSS.

Ab affini *Ch. prostrato* Bge. foliis deltoideis, manifeste trilobatis differt.

2. *Ch. pamiricum* Iljin sp. nova.

Planta annua, 3—20 cm alta, a basi ramosa, valde farinosa, habitu *Ch. vulvaria* L., non foetida saepe purpurascens; folia parva petiolata, lamina ovata vel subhastata, obtusa vel obtusiuscula, 0.25—0.75 mm longa, integerrima. Flores hermaphroditi; phylla perianthii oblonga, basi solum concreta, vix carinata, obtusa, a tergo farinosa; stamina 5. Semina horizontalia, circa 1 mm diam., pericarpio striis radiatis ornato, compressa, nitida, fere laevia, margine subacuta.

Area geogr.: Pamir orientalis.

Typus: Declivia ad confluentes Baital et Murgab, I XI 1923, leg. H. Raikova (Herb. As. Med. in Taschkent).

Haec species nova ad *Ch. Karo* Aellen accedit, sed foliis parvis, structura seminum, pericarpio non foveolato recedit.

ATRIPLEX L.

3. *A. megalotheca* M. Pop. sp. nova.

Planta annua, 30—50 cm alta, caulibus erectis vel adscendentibus, ramosis, ramis inferioribus approximatis, oppositis, fere decumbentibus; folia

* [This appendix has been reproduced photographically from the Russian original.]

874 *alterna*, ovoidea vel ovoideo-hastata, brevipetiolata, obtusa, basi late cuneata, integerrima, subtus tantum vel non raro utrinque farinosa. Flores axillares in glomerulos dispositi; glomeruli feminei 5—20-flori; bracteolae magnae, plerumque 10—45 mm longae et 8—35 mm latae, trilobatae, farinosae, lobo medio elongato, integerimo, obtuso, fructificatione in parte inferiore convexae, duriusculae, dense verrucoso-appendiculatae, concretae, in parte superiore herbaceae, liberae, longepedicellatae, pedicellis ad 50 mm longis instructae. Semina ovalia vel rotundato-ovalia, 2.5—3 mm longa et 2—2.5 mm lata.

Area geogr.: Kazachstanica austro-orientalis et Kaschgaria.

Typus: Kaschgaria. Ad radices australes Tjan-Schan, inter Ak-su et Kuczej, prope pagum Dshurga, 3 VIII 1929, n° 681, leg. M. G. Popov; in Herb. Inst. Bot. Ac. Sc. URSS.

Species nova a ceteris valde distinctissima.

CERATOCARPUS L.

4. *C. turkestanicus* Sav.-Rycz. sp. nova.

Planta annua, 3—30 cm alta, dense stellato-pilosa, caulibus a basi ramosissimis; folia linearia vel oblonga, 2—7 cm longa et 2—10 cm lata, mucronata, ad basin attenuata vel fere brevipetiolata. Bracteolae (fructificatione) obovoideae vel oblongo-obovoideae, plerumque 5—10 mm longae, rarius ad 15 et 4—7 mm latae, appendicibus rectis, divergentibus, tenuiter subulatis, ad 15 mm longis.

Area geogr.: Armenia, Turcia, Iran, Asia Media.

Typus: Turkmenistanica, prope urbem Aschchabad, V 1900, n° 286 leg. Sintenis; in Herb. Inst. Bot. Ac. Sc. URSS.

A *C. arenario* L. foliis latioribus, bracteolis obovoideis dignoscitur.

CORISPERMUM L.

5. *C. Hilariae* Iljin sp. nova.

Planta annua, 5—10 cm alta, laete viridis, ex toto glabra, a basi ramosissima, ramis inferioribus; folia oblanceolata, oblonga vel oblongo-linearia leviter falcata, acuta vel mucronulata, usque ad basin attenuata. Inflorescentia spiciformis, angusta, non densa, bracteis (excl. infer.) oblongo-ovoideis vel ovalibus, late albide marginatis, acuminatis, fructibus longioribus et vix angustioribus, supremis subaequilongis; perianthium monophyllum phyllo ovali vel rotundato-ovalis, apice inciso-dentato; stamina 1—3, mediis perianthio 1.5—2-plo longioribus. Fructus ovalis vel oblongo-obovoideus, 2.5—3.5 mm longus et 2—2.5 mm latus, in fronte vix convexus, a tergo subplanus, glaber, leviter nitidus, plus minusve verruculosus, apice late triangularis, alatus, ala tenui, flavescenti, subpellucida, vix denticulata, angusta, nucleo obscure-olivaceo $\frac{1}{5}$ — $\frac{1}{10}$ angustiore.

Area geogr.: Pamir.

Typus: Murgab, locus Boguczi, in valle fl. Ak-su, 32 VIII 1934, n° 247, leg. Hilaria Raikova; in Herb. As. Med., Taschkent.

Species nova a *C. tibetico* Iljin glabritate omnium partium aberrit.

6. *C. gelidum* Iljin sp. nova.

Planta humilis, 3—6 cm alta a basi ramosa, ramis inferioribus adscendentibus, plerumque purpurascens, sparsim pilosa; folia linearia, acuta, usque ad basin vix attenuata, inferiora reclinata, superiora suberecta. Inflorescentia breviter spiciformis, densa, bracteis ovalibus late et albide membranaceo marginatis, acutis, fructibus leviter longioribus, inferioribus longioribus; perianthium monophyllum, phyllo ovali, apice emarginato-dentato; stamina 3, mediis perianthio subduplo longioribus. Fructus ovalis, 3—4 mm longus et 1.75—2.75 mm latus, in fronte convexus, a tergo concavus, utrinque pilosus, apice in rostrum brevem attenuatus, alatus, ala subpellucida, denticulata, undulata, nucleo magis obscuro $\frac{1}{3}$ — $\frac{1}{6}$ angustiore.

Area geograph.: Pamir.

Typus: In ditione lacuum Rang-kul, prope vallem Zor-Burljuk, 29 VIII 1935, leg. Hilaria Raikova; in Herb. As. Med., Taschkent.

Nostra species a *C. Korovini* Iljin inflorescentia crassiore, alis fructu latoribus, magis pellucidis et undulatis, nucleo convexo discrepit.

ANTHOCHLAMYS FENZL

7. *A. turcomanica* Iljin sp. nova.

Planta annua, 15—50 cm alta, glabra vel in inflorescentia vix brevissime et sparsim pilosa; folia inferiora ovalia vel oblango-ovalia, breviter petiolata, reliqua angustiora. Inflorescentia superne abbreviata; perianthium 1—1.5 mm longum, phyllis infra concretis. Fructus rotundatus, 3—4 mm diam., late alatus, ala undulata, apice manifeste et semper profunde et anguste emarginata, medio non rostrata.

Area geograph.: Turkmenistania.

Typus: montes Malye Balchany, leg. Bobrov.

Ab affini *A. polygaloide* (F. et M.) Fenzl structura fructus sat distat.

SALSOLA L.

8. *S. subcrassa* M. Pop. sp. nova.

Planta annua, 15—40 cm alta, a basi ramosa, ramis inferioribus elongatis, infra subperplexe-pilosa, pilis elongatis, mox deciduis, supra subglabra vel sparsim brevissime pilosa; folia alterna, carnosa, obtusa, subdecurrentia; bracteata, ovoidea. Flores in inflorescentiam spiciformem dispositi; phylla perianthii glabra, fructificatione alata, alis roseo-purpureis (semper?); antherae appendicibus rotundato-ovalibus, brevissime pedicellatis, vesiculosus instructae; stigmata subulato-filiformia, stylo triplo-quadruplo longiora.

Area geogr.: Kaschgaria et Zaisan.

Typus: Kaschgaria, prope urbem Urumdzi, 28 IX 1929, n. 922, leg. M. Popov.

A *S. crassa* M. B. stigmatibus valde longioribus, a *S. transoxana* Iljin perianthio glabro facillime dignoscitur; in Herb. Inst. Bot. Ac. Sc. URSS.

9. ***S. lachnophylla*** Iljin sp. nova.

Planta annua, ad 30 cm alta, densissime molliter villosa, pilis solum longis instructa, a basi ramosa, caulibus et ramis albidis; folia subcylindrica, obtusa, crassa, 7—10 mm longa et 1.5 mm lata, vix decurrentia, reclinata, inferiora valde perplexe villosa, floralia bracteolis vix longiora. Perianthium phyllis membranaceis, acutis; villosis; antherae lineares, 2—2.5 mm longae, appendicibus sphaeroideis, vesiculosus, albide roseis instructae, stigmata fere subsessilia.

Area geograph.: Usbekistania.

Typus: Dalversinskaja steppa inter lacus Vneschneje Solenoje et Koschkul, 7 IX 1916, leg. Turner; in Herb. Inst. Bot. Ac. Sc. URSS.

A *S. intricata* Iljin indumento et stigmatibus secernitur.

10. ***S. Baranovii*** Iljin sp. nova.

Suffrutex 12—15 cm altus, caulibus annotinis brevibus, tenuibus, hornotinis simplicibus, 1—1.5 mm diam., breviter et tenuiter pilosis; folia linearia subcylindrica, 8—12 mm longa et circa 1 mm diam., obtusa, basi dilatata, supra basin strangulata, subappresse breviter pilosa, floralia, arcuato-inflexa, flores valde superantia; bracteolae dilatatae floribus vix longiores. Inflorescentia spiciformis; phylla perianthii obtusa, late membranaceo marginata, pilosa, conniventia, fructificatione alata, alis semiorbicularibus et late obovatoideis; antherae vix conspicue appendiculatae, appendicibus albidis, tuberculatis, stigmata longe filiformia, 1.75—2 mm longa, manifeste papillaria, recurva, stylo brevi, circa 0.5 mm longo.

Area geogr.: Vallis Alai.

Typus. In loco Dshangali in valle Kisyl-su, declivia schistosa, 10 IX 1927, n° 1578 leg. H. Raikova et P. Baranov; in Herb. As. Med., Taschkent.

11. ***S. Vvedenskyi*** Iljin et M. Pop. sp. nova.

Planta annua, 15—40 cm alta, ramosa, valde villosa, pilis difformibus; longis articulatis, scabridis, et brevibus ramulosis; folia alterna, crassiuscula, subcylindrica, obtusa, basi vix dilatata, in parte inferiore caulis numerosissima, perplexe villosa, floralia bracteolis dilatatis subaequilonga, atque bracteolae sub anthesi conniventia, fructificatione patentia. Flores solitarii, phylla perianthii villosa, conniventia, alata, alis reniformibus vel semiorbicularibus; antherae disjunctae, appendice lanceolata, non colorata instructae; stigmata filiformia, elongata, stylo brevissimo multoties longiora. Fructus verticalis vel horizontalis.

Area geogr.: Usbekistania australis, Turkmenistania australi-orientalis et Tadshikistania occidentalis.

Typus: prope urbem Kelif, 12 IX 1916, leg. Androssov; in Herb. Inst. Bot. Ac. Sc. URSS.

Species valde propria.

12. *S. stellulata* Eug. Kor. sp. nova.

Suffrutex, 10—20 cm altus, a basi ramosissimus, pilis brevissimis stellulatis obtectus; folia subcylindrica, brevia, 5—10 mm longa, superiora breviora, obtusa, sessilia, basi vix dilatata, patentia, floralia ovoidea vel latiora, bracteolis obtuse carinatis valde breviora. Phylla perianthii membranacea, villosa, fructificatione alata, alis membranaceis, reniformibus, plerumque purpureis (alis duabus fere non evolutis); antherae disjunctae, appendice lanceolata, acuminata, pallida, scabrida, antherae subaequilonga; stigmata subsphaeroidea, stylo subaequilonga.

Area geogr.: Turkmenistania australis.

Typus: montes Kopet-dagh, prope urbem Kisyl-Arvat, leg. Eug. Korovin; in Herb. As. Med., Taschkent.

Ab affini *S. aurantiaca* Bge. indumento manifeste divertit.

RHAPHIDOPHYTON ILJIN gen. nov.

Flores hermaphroditi, pentameri; phylla perianthii fructificatione alata; stamina 5, antherae sagittatae ad appendices disjunctae, appendice acuminata, sessili instructae; lobis disci semiorbicularibus; stigmata 2, subulata; ovarium sphaeroideum vel sphaeroideo-ovale. Semen horizontale, rarius verticale, partem inferiorem pericarpium solum occupans; embryo spiralis.

Genus novum a *Noaea* Boiss. seminibus, forma pericarpium, antheris disjunctis, structura appendicum et habitu primo intuitu distinctissimum.

13. *Rh. Regelii* (Bge.) Iljin comb. nova.

ILJINIA EUG. KOR. gen. nov.

Floribus hermaphroditis solitairis axillaribus, bibracteatis; perigonio depresso-globoso herbaceo fructifero subchartaceo paulo immutato, alato; ejus phyllis conniventibus, ovatis concavis enervibus, dende vix durescentibus medioque transverse alatis, alis patentibus; staminibus disco extus insertis filamentis abbreviatis filiformibus, antheris punctiforme appendiculatis; ovario depresso-globoso conico, stylo brevissimo stigmatibus duabus patule-excurvis, dilatatis intus papillosis terminato; disco staminifero profunde lobato circumdato, lobis ovatis truncatis margine incrassato-papillosis tantum a basi inter se connatis.

Genus bene distinctum a *Salsola* L. disco staminifero crasso lobato, ab *Arthrophyto* Schrenk perigonii structura omni, stigmatibus rigidulis folisque

878 sparsis, a *Haloxylon* Bge stigmatibus duobus, disci lobis incrassatis papillois, foliis sparsis distinguitur.

14. **J. Regelii** (Bge.) Eug. Kor. — *Haloxylon Regelii* Bge., *Arthropytum Regelii* (Bge.) Litw., *Salsola Regelii* Litw.

ANABASIS L.

15. **A. micradena** Iljin sp. nova.

Planta annua, 6—20 cm alta, glabra; caulis ab ima basi trichotome ramosissimus, teretiusculus, quadrisulcatus; folia carnosae, semiamplexicaulia, oblonga, subcylindrica, 6—10 mm longa et 1.5—2.5 mm crassa, infima oblonga vel spatulata, plana, 10—16 mm longa et 4—6 mm lata, mox decidua, apice rotundata, setifera, setis persistentibus, 2—5 mm longis. Flores numerosissimi, fere in omnibus axillis terni, quini vel septeni; phylla perianthii ovalia, obtusa, integerrima, fructificatione leviter accrescentia, uninervia, nunquam chartacea et callosa, non marginata, omnia supra medium alifera, alis pallidis, majoribus reniformibus, minoribus obovoideis; ovarium dense et minute papillosum, stigmata subulata, sessilia.

Area geogr.: Asia Media australis.

Typus: Kara-Kalpakia, iter Amu-Darja, takyr prope declivia cretacea inter montes Sultan Uiz-Dagh et Ky-Ajaz, 6 X 1912, leg. N. Dimo; in Herb. Inst. Bot. Ac. Sc. URSS.

Ab affini *A. annua* Bge. foliis floralibus et bracteolis obtuse carinatis, phyllis perianthii fructificatione non marginatis bene differt.

16. **A. Abolini** Iljin sp. nova.

Suffrutex, 10—25 cm altus, ramis lignosis brevibus, multipliciter divergentibus, densis, inter se valde approximatis, caulibus hornotinis laevibus, simplicibus, subcylindricis, bi- vel rarius quadristriatis; folia linearia, 5—8 mm longa, subcylindrica, crassa, subclavata, patentia, setifera, setis 1—2 mm longis, crassis et incurvatis. Flores plerumque terni; phylla perianthii ovalia vel ovata, obtusa, convexa, fructificatione infra medium alata; stamina filamentis subulatis, brevissimis, 0.5—0.75 mm longis, antheris non appendiculatis subsessilibus; lobi disci ovati, glanduloso-fimbriati, glandulis plus minusve longestipitatis, stipite plerumque 2—3-cellulari; ovarium vix papillosum.

Area geogr.: Tjan-Schan centralis.

Typus: Distr. Ketmen-tube in loco Tachtalyk, 24 VII 1927 n° 544, leg. R. Abolin; in Herb. Inst. Bot. Ac. Sc. URSS.

Ab *A. affini* F. et M. forma ramificationis, caulibus hornotinis semper laevibus, setis foliorum crassis et incurvatis, filamentis brevissimis, subulatis, antheris subsessilibus, lobis disci glanduloso-fimbriatis sat distat.

17. **A. turkestanica** Iljin et Eug. Kor. sp. nova.

Planta perennis, 30—50 cm alta, pallide viridis, radice elongata, nigrescenti; caules crassiusculi, basi 4—10 mm diam., manifeste quadranguli,

179 glabris, ex 20—25 internodiis compositi, vix conspicue (sub lente!) verruculosi a basi ramosi, ramis etiam ramosis, squamae basilares dilatatae, approximatae, appressae, reliquae late-triangulares vel triangulato-ovoideae, apice margineque flavescentes vel fere lateritiae, membranaceae et insuper angustissime pellucide marginatae, in mucronem paleaceum, subpellucidum, 2—3 mm longum attenuatae. Flores singulares, bracteolis ovalibus, membranaceis, iis brevioribus instructi; phyllis perianthii paleaceis, obtusis; staminodiis ovalibus, margine incrassatis et fimbriato-glandulosis, perianthio subduplo brevioribus.

Area geogr.: Uzbekistania, Golodnaja steppa.

Typus: Golodnaja steppa, prope puteum Kara-Kamysch, 19 VI 1915, n° 408, leg. M. D. Spiridonov; in Herb. Inst. Bot. Ac. Sc. URSS.

Ab affini *A. ferganica* Drob. caule quadrangulo, foliis omnibus mucronulatis statim aberrit.

18. *A. pauciflora* M. Pop. sp. nova.

Alte suffruticosa, ramosissima, 30—40 cm alta. Caules herbacei (hormotini) brachiatim ramosi ramis herbaceis crassis oppositis patentibus. Folia ad vaginas intus lanatas brevissimas triangulares reducta. Flores oppositi v. abortu solitarii, pauci, ad ramorum latera nec ad apices (spiciformiter) dispositi. Perianthium majusculum phyllis subplanis fere sub apice alatis, alis (5) parvis curvatis subhorizontalibus.

Typus: Ad ripam septentrionalem lacus Balchasch ad colles Kounrad, in declivio salso agrillaceo, fr. 9 X 1935, leg. M. Popov et N. Rubtsov; in Herb. Almaatensi.

Ab *A. aphylla* L., cui habitu similis, nostra species differt floribus paucis ad ramorum latera nec ad apices (spiciformiter) dispositis, ramis crassioribus et praesertim perianthiis triplo majoribus, vaginam floriferam (bracteam) multo superantibus sub apice alisque 5 subhorizontalibus parvis.

ARTHROPHYTUM SCHRENK

19. *A. leptocladum* M. Pop. sp. nova.

Suffrutex, 25—60 cm altus, ramosissimus, ramis hornotinis rigidiusculis, glabris, laevibus, cylindricis, folia subcylindrica, brevia, 1—3 mm longa, obtusiuscula, ad caulem subappressa vel vix patentia. Flores solitarii, bracteolis rotundatis, anguste membranaceo-marginatis, obtuse carinatis in paniculam latam dispositi; phylla perianthii fere herbacea, membranaceo-marginata, obtusa, fructificatione alata, alis subrotundatis, membranaceis; filamentis basi alte concretis lobi disci semiorbiculares, papilloso-fimbriati. Fructus 2—2.5 mm diam.

Area geogr.: Tadshikistania et Turkmenistania extremo-australi-orientalis.

Typus: Prope urbem Kelif, 12 IX 1916, leg. Androssov; in Herb. Inst. Bot. Ac. Sc. URSS.

Ab *A. wakhanico* (Paul.) Eug. Kor. statura humiliore, foliis brevioribus secernitur.

20. *H. lachnantha* Eug. Kor. sp. nova.

Planta annua, 5—20 cm alta, basi ramis elongatis, adscendentibus instructa, molliter, non dense, pilis patentibus oblecta vel subglabra; folia linearia, anguste subcylindrica, sessilia, obtusa, apice fasciculato-setifera, fasciculis deciduis, 10—25 mm longa, basilaria in rosula disposita, floralia bracteolis vix longiora; phylla perianthii oblonga vel oblongo-ovalia, apice truncata et denticulata a tergo longe et dense villosa; antherae infra ad $\frac{1}{2}$ — $\frac{1}{4}$ liberae, appendice oblongo-ovoidea leviter obtusa, pallida vel interdum vix rosacea, scabrida, anthera valde brevior instuctae; stigmata elongata, filiformia, stylo subaequilonga.

Area geogr.: Turkmenistania orientalis.

Typus: arenae Kara-Kum australi-orientales inter puteis Czaryschly et Ekizen, 21 IV 1925, leg. Eug. Korovin; in Herb. As. Med., Taschkent.

CLAYTONIA GRONOV.

21. *C. Vassilievii* Kuzen. sp. nova.

Perennis; rhizoma tenue, longum, repens, ramosum, caules floriferos et surculos steriles foliosos emittens; caules tenues parvi unacum inflorescentia 3—4 cm alti; folium caulinum unicum lineare, 1 cm longum et 1 mm latum, obtusum, basi amplexicaule; folia radicalia non numerosa, 1—3 (raro deficientia) et folia stolonum linearia, 1.5—3 cm longa et 1—3 mm lata, obtusa. Racemus lusus, 2—4-florus, 1.5—2 cm longus, basi unibracteatus, bractea late-ovata, 4—5 mm longa; pedicelli longi post anthesin flexuosi, raro erecti (4) 10—15 mm longi; lobi calycini lati, (2.5) 3—4 mm longi, rosei, petala alba, 6—8 mm longa, stamina calyce longiora, semina orbicularia.

Typus: Regio anadyrensis, in jugo Rarytkin, in monte Irgunei, tundra montana pratosa. Fl. 18 VIII 1933. Leg. V. Vassiliev; in Herb. Ac. Sc. URSS conservatur.

Ab affini *C. sarmentosa* C.A.M. folio caulino unico lineari (nec foliis 2, latis) statim dignoscitur.

STELLARIA L.

22. *S. karatavica* (Lipsch.) Schischk. — *Arenaria karatavica* Lipsch. ined. — *Stellaria dichotoma* β . *heterophylla* Rgl. in sched. (non Fenzl). — *S. serawschanica* M. Pop. in schedis.

Perennis; caules 10—15 cm alti, numerosi, ramosissimi, teretiusculi, breviter pubescentes; folia sessilia, anguste lanceolata, acuminata, 1—3 cm longa et 4—6 mm lata. Flores numerosi in pedicellis longiusculis paniculam corymbosam formantes; sepala ovato-lanceolata 6—8 mm longa, acuminata, albo-marginata, dorso pubescentia, petala calyce vex longiora apice retusa.

Hab.: In declivitatibus siccis.

Typus: Asia Media. Montes Karatau, in clivis montanis siccis, alt. ca. 1500 m. Fl. 11 V 1866. Leg. N. Severtzov; in Herb. Ac. Sc. URSS conservatur.

Differt ab affinibus: *S. dichotoma* L. et *S. amblyosepala* Schrenk calycibus 6—8 mm (nec 3.5—4.5 mm) longis.

23. *S. fontana* M. Pop. sp. nova.

Perennis; tota planta laevis, glabra; caulis debilis, adscendens, 5—15 cm longus, plus minusve ramosus; folia lanceolato-linearit, 7—20 mm longa et 1.5—3 mm lata, acuta, basi angustata, viridia vel glauco-viridia. Flores in apice caulis solitarii vel 3—5, pedicelli tenues 1—3 cm longi; bracteae lanceolatae, totae scariosae vel late albo-marginatae, 2—4 mm longae; sepala ovato-oblonga 4—5 mm longa et 1.5 mm lata, acuta, marginibus late scariosa, glabra; petala alba calycem aequantia vel eo paulo longiora breviorave.

Hab.: Ad ripas rivulorum montanorum.

Typus: Asia Media: Schachrizjabs, prope pag. Gilam, in petrosis humidis ad ripam rivuli. Fl. 19 V 1916. M. Popov; in Herb. Ac. Sc. URSS conservatur.

Ab affini *S. brachypetala* Bge. petalis longioribus et foliis glaberrimis (nec basi ciliatis) differt.

24. *S. soongorica* Roshev. sp. nova.

Perennis, caespites laxos formans vel caules singulos emittens; rhizoma tenue, repens; caulis 15—20 cm altus, plus minusve quadrangularis, simplex vel vix ramosus, adscendens, tenuis, glaber vel lanuginoso-pubescent; folia anguste lineari-lanceolata, longe acuminata, 6 cm longa et 4 mm lata, glabra nervo mediano et laterallibus prominulis. Flores in apice caulium non numerosi vel interdum solitarii, pedicellis 4—6 (8) cm longis; bracteae lanceolatae, acuminatae, marginibus scariosae, sepala ovato-lanceolata, acuminata, 5 mm longa, albo-marginata, glabra, nervis conspicuis; petala alba calyce paullulum longiora, fere usque ad basin bifida lobis oblongo-lanceolatis, obtusis; filamenta basi sensim dilatata, antheris brunneis, 1—1.25 mm longis; capsula oblongo-ovata calyce paulo longior maturatione brunnescens; semina reniformi-orbicularia, aliquot lateribus compressa, tenuiter tuberculata.

Hab.: In piceetis montanis.

Typus: Kazachstan. Distr. Dzsharkent (olim) in monte Ak-tasty-tau. Fl. 28 VI 1910 A. Michelson; in herb. Ac. Sc. URSS conservatur.

Appropinquat ad *S. peduncularem* Bge, sed foliis 3—6 cm (nec 1—3) longis et calyce majore distinguitur.

25. *S. arctica* Schischk. sp. nova. Sect. *Eustellaria* Fenzl in Endl. Gen. (1840) 969.

Perennis, caespitem densum interdum subpulviniformem formans; caules quadrangulares, glabri, 3—5 cm alti, in parte inferiore arcte, subimbricatim

882 foliosi; folia coriacea, late vel anguste ovata, 5—9 mm longa et 3—4 mm lata, acuta, sessilia, glabra vel basi sparse ciliata, glaucescentia, interdum vio aceo-colorata. Flores in pedicellis glabris crassiusculis, 10—20 mm longis ex axillis foliorum supremorum orientes solitarii vel (rarissime) bini; sepala ovata, 3.5—4 mm longa nervo mediano prominente, lateralibus tenuibus, obtusiuscula, marginibus albo-scariosa ciliataque; petala alba 6.5—7 mm longa, fere usque ad basin bifida lobis ovatis, acutis obtusiusculisve; stamina 10 disco glandulifero assidentia; ovarium multiovulatum stylis tribus.

Hab.: In glareosis maritimis, lat. septentr. 69.5°—0.71°.

Typus: Oriens Extremus. Peninsula Czukotsky, in promontorio Schmidt (Severnyi, apud Kjellmann'a — Irkapij). 2 VIII 1934. Leg. B. Gorodkov; in herb. Ac. Sc. URSS conservatur.

Nostra species valde affinis *S. Fisherianae* Ser., sed foliis supra glabris secernitur. Appropinquat atque ad *S. ruscifoliam* Willd., sed calycibus 3.5—4 mm tantum longis (nec 6—8) bene differt.

26. **S. schugnanica** Schischk. sp. nova (Sect. *Oligosperma* Boiss. Fl. Or. I, 1867, 705).

Perennis, radix tenuis, longa, albescens; caules numerosi, debiles, adscendentes, 4—10 cm longi, caespitem laxum formantes, inferne glabri, superne tenuiter glanduloso puberuli; folia lineari-oblonga, 5—13 mm longa et 1.5—2 mm lata, plana, acutiuscula, laete-viridia, tenuiter glanduloso-puberula vel glabra, internodiis longiora. Flores in apice caulium solitarii in pedicellis 5—10 mm longis, glandulosis, bractee hebraceae; sepala 4, ovata, 4 mm longa et 1.5 mm lata, acuta, nervis 4 vix distinctis; marginibus anguste scariosa, dorso glandulosa; bractee herbaceae; petala 4, alba calyce 1½—plo longiora, usque ad medium bifida lobis oblongis, apice rotundatis; stamina 8, de quibus 4 basi glandula instructa, ovarium 8—10-ovulatum, capsula ignota.

Hab.: In rupestribus humidis alpinis.

Typus: Asia Media. Schugnan. In declivitatibus septentrionalibus jugi Vrang, in loco Schoibyn, alt. ca. 4250 m. Fl. 16 VIII 1935. Leg. P. Ovezinikov; in herb. Ac. Sc. URSS conservatur.

Appropinquat ad *S. Martjanovii* Kryl., sed foliis linearibus nec oblongo-ovatis differt.

27. **S. Alexeenkoana** Schischk. sp. nova (Sect. *Oligosperma* Boiss. Fl. Or. I (1867) 705).

Perennis; radix sat longa; caules numerosi, debiles, abscendentes, caespitem laxum formantes, inferne fere glabri, superne pilis patulis simplicibus sparsim obtecti; folia lineari-lanceolata 7—17 mm longa et 1—2.5 mm lata, interdum glaucescentia, acuta, pilis mollibus simplicibus obsita. Flores in axillis foliorum superiorum in pedicellis brevibus (2—5 mm longis), pilis articulatis vestitis, bractee nullae, sepala 4, anguste-ovata, 4 mm longa et 1 mm

883 lata, acuta, nervis indistinctis, in parte inferiore crispule pubescentia; petala 4, alba, calyce breviora vel eo subaequilonga, lamina usque ad dimidium bifida lobis lineari-oblongis; stamina 8, de quibus 4 basi glandula instructa, ovarium 8—10-ovulatum, capsula calyce brevior; semina orbiculari-reniformia, 0.8 mm in diam., sublaevia.

Hab.: In lapidosis ripariis.

Typus: Asia Media. Tagdumbasch Pamir (terra chinensis). In angustiis Pistan, jugi Sayr-bas, alt. ca. 3900 m. Fl. 15 VII 1901. Leg. Th. Alexeenko; in herb. Ac. Sc. URSS conservatur.

Non dissimilis est *S. schugnanicae* Schischk. sed petalis calyce brevioribus et calycibus foliisque pilis simplicibus (nec glandulosis) tectis ab ea abhorret.

CERASTIUM L.

28. **C. Gorodkovianum** Schischk. sp. nova. (Sect. *Orthodon* Ser. in DC. Prodr. I (1824) 415).

Perennis; rhizoma tenue, oblique adscendens; caules 5—16 cm alti, basi adscendentes, subglabri, albescentes, superne erecti et pilis patulis brevibus, glanduliferis intermixtis obtecti; folia elliptica vel ovata, 6—20 mm longa et 3—8 mm lata, obtusiuscula, inferiora in petiolum plus minusve longum attenuata, superiora sessilia, pilis mollibus longiusculis pubescentia. Flores in apice caulis 2—5, in cymate laxo, interdum cernui, pedicelli 5—7 mm longi, glanduloso-pubescentes, bractee ovato-lanceolatae, marginibus in parte superiore scariosae; sepala ovata, 5.5 mm longa, glanduloso-pubescentia, scarioso-marginata, acutiuscula; petala alba, calyce vix vel triente longiora, apice usque ad $\frac{1}{4}$ — $\frac{1}{3}$ bifida, glabra.

Hab.: In pratis arenosis ripariis zonae borealis silvaticae.

Typus: Ural septentrionalis, systema fl. Lapin, confl. fl. Sev. Sosva. Ad fontes amnis Manja, in prato ripario in zona silvatica. Fl. 27 VI 1927. Leg. V. Soczava; in herb. Ac. Sc. URSS conservatur.

Valde affine *C. tianschanico* Schischk. sed caulibus brevioribus, foliis ellipticis (nec lanceolatis) brevioribus sat distinctum est. Appropinquat atque ad *C. Beeringianum* Cham. et Schlecht. sed petalis calyce vix (nec subduplo) longioribus, calycibus majoribus foliisque latioribus discernitur.

29. **C. dagestanicum** Schischk. sp. nova (Sect. *Orthodon* Ser. in DC. Prodr. I (1824) 415).

Perenne; tota planta albo-tomentosa; caules basi adscendentes, 7—15 cm alti, fragiles; folia lanceolata, 1—2.5 cm longa et 4—5 mm lata, acutiuscula. Flores in cymate pauci (3—8)-floro in pedicellis calyce aequilongis, brevioribus longioribusve, sepala lanceolata 6—9 mm longa, acuta, tergo velutina, marginibus scariosa; petala calyce duplo longiora, lamina usque ad dimidium bifida lobis ovatis, filamenta unguisque glaberrimi; capsula calyce vix vel sesquialongior, dentibus apice revolutis; semina acute tuberculata.

Hab.: In rupium fissuris, in declivitatibus lapidosis herbosisque.

Typus: Dagestania, Achty 1880, Leg. Becker; in Herb. Ac. Sc. URSS conservatur.

Valde similis *C. Szowitsii* Boiss. et ab eo difficile discernitur, tamen floribus numerosioribus, capsulis brevioribus, foliis nonnihil latioribus, dentibus calycinis revolutis (nec erectis) videtur sat diversum est.

MINUARTIA L.

30. *M. Buschiana* Schischk. sp. nova.

Perennis, caespitem laxum formans; caules 6—8 (12) cm alti, adscendentes, numerosi, simplices vel superne ramosiusculi, breviter asperulo-pubescentes vel subglabri; folia setiformia 10 mm longa et 0.2—0.6 mm lata, glabra, trinervia, stricta, marginibus ciliatula. Flores in dichasio 3—7-floro in apice caulium, pedicellis 2—7 mm longis; bracteae lanceolatae, 2 mm longae, acutae, anguste albo-marginatae; sepala ovato-lanceolata, 3—5 mm longa, acuta, nervo mediano prominente lateralibus binis, viridibus, marginibus anguste scariosa, petala oblongo-ovata calyce $1\frac{1}{2}$ plo longiora; capsula calyce paulo brevior; semina reniformi-orbiculata, 0.75—1 mm longa.

Hab.: In saxosis regionis subalpinarum et alpinarum.

Typus: Kuban prov. In cacumine montis Baranachi, in rupibus. Fl. 31 V 1907 Leg. N. A. Busch; in Herb. Ac. Sc. URSS conservatur.

Nostra species valde affinis *M. setaceae* Thuill., sed seminibus majoribus et sublaevibus (nec acute tuberculatis) sat differt.

31. *M. micrantha* Schischk. sp. nova.

Perennis, basi lignescens, ramosissima, caespites densos formans; caules herbacei numerosi, basi adscendentes, 6—20 cm alti, simplices, breviter puberuli; folia lineari-subulata, 5—12 mm longa et 0.3—1 mm lata, marginibus breviter ciliata, trinervia, cauli adpressa vel aliquot reclinata. Flores apice caulium in cymatibus 3—7-floris, pedicellis glabris 2—7 mm longis, sepala ovato-lanceolata 2.6—3.5 mm longa, uninervia, acuta; petala anguste ovata, calyce aequilonga vel eo breviora; capsula calyce brevior, semina ad 0.6 mm longa, indistincte brevissime tuberculata.

Hab.: In rupestribus.

Typus: Turcia. Distr. Artwin (olim). In faucibus fl. Alvana-su prope Czarobieta. Fl. et fr. 29 VI 1911. Leg. Vvedensky; in herb. Ac. Sc. URSS conservatur.

Ab affini *M. setacea* (Thuill.) Hayek calycibus 2—2.5 (nec 3—3.5 mm) longis et caespitibus densis distincta est.

32. *M. Woronowii* Schischk. sp. nova.

Perennis, basi vix lignescens, caespites plus minusve densos formans; caules numerosi 8—25 cm alti, simplices vel in inflorescentia ramosi, inferne

885 breviter puberuli, superne fere semper glabri; folia setiformia, 5—11 mm longa et 0.2—0.5 mm lata, acuta, basi subdilatata rite cauli adpressa. Flores apice caulium in cymate paucifloro, pedicellis filiformibus glabris, 4—12 mm longis, sepala lanceolata 4—5.5 (6) mm longa, acuta vel acuminata, uninervia; petala calyce sublōngiora; semina oblonga, ad 1 mm longa, laevia.

Hab.: In rupium fissuris.

Typus: Georgia, Tbilissi (Tiflis) in collibus prope Vake. Fl. 4 VI 1917. Leg. G. Woronow; in herb. Ac. Sc. URSS conservatur.

A speciebus affinibus seriei „*Setaceae*“ calycibus majoribus, 4—6 mm longis statim dignoscitur.

33. **M. gracilipes** Kom. comb. nova. — *Alsine gracilipes* Kom. in Kom. et Alis. Key pl. East. reg. URSS I (1931) 495.

Perennis, caespites formans, caules arcte congesti, numerosi, floriferi tenues, 15—20 cm alti, glabri, subracemosi vel simpliciter, turiones steriles internodiis abbreviatis dense foliosi, folia anguste-linearia, 10 mm longa et 0.3—0.5 mm lata, glabra, rigidiuscula, vena mediana crassa, venis duabus lateralibus tenuioribus, sectione transversali subtriangularia, acuta, in axillis foliorum inferiorum turionumque fasciculifera. Flores apice caulium aliquanti, raro solitarii, pedicelli filiformes, 1.5—6 cm longi, bracteae parvae, lanceolato-lineares, scarioso-marginatae; sepala ovata 5 mm longa trivenia, marginibus anguste scariosa; petala alba calyce sesquilongiora; capsula ovata, calyce brevior.

Hab.: In abruptis calcareis.

Typus: Oriens Extremus, distr. Vladivostok, prope pag. Novo-Nikolaevka. Fl. 31 VII 1930. Leg. J. Schischkin; in Herb. Ac. Sc. URSS conservatur.

Foliis rigidiusculis, glabritate totae plantae appropinquat ad *M. lineatam* (C. A. M.) Bornm., sed pedicellis calyce 5—12-plo longioribus, foliis brevioribus et capsula calyce brevior bene differt.

34. **M. Litwinowii** Schischk. sp. nova. — *M. Aucheriana* var. *glandulosa* Litw. in Trav. Mus. bot. Ac. Sc. Pétersb. III (1907) 106.

Perennis; radix lignosa caules floriferos 4—10 altos et surculos numerosos steriles dense foliosos emittens foliis cum pilis glanduliferis brevibus obtectis; folia linearia, 4—5 mm longa et 0.5—2 mm lata, trinervia, acuta vel obtusiuscula, inferiora mox marcescentia. Flores apice caulium in numero 1—3, pedicellis 2—10 mm longis, glandulosis; bracteae ovatae, acutae, herbaceae, sepala lanceolata 5—6.5 mm longa, trinervia, acuta vel acuminata, glanduloso pubescentia, anguste scarioso-marginata, superne interdum subcolorata; petala calyce sesquilongiora; capsula oblonga calycem subaequans.

Hab.: In saxosis rupestribusque.

Typus: Asia media. Turcomania. Montes Kopet-dagh, in angustiis Karanky, alt. ca 1800 m. 6 VI 1898. Leg. D. Litwinow; in herb. Ac. Sc. URSS conservatur.

Non dissimilis est *M. Aucherianae* (Boiss.) Bornm. et *M. tauricae* (Stev.) Asch. et Graebn. sed a priori indumento valde glanduloso, a posteriore calycibus majoribus, pedicellis brevioribus discrepat.

35. *M. orthotrichoides* Schischk. sp. nova. — *Arenaria hirta* var. *glabrata* Cham. et Schlecht. in Linnaea 1 (1826) 56, ex parte. — *A. glabrata* Cham. et Schlecht. ex Mattf. im Beihefte z. Repert. spec. nov. XV (1922) 171 nom. nud., partim.

Perennis, caespites densos formans; caules numerosi humiles, 1—2 cm alti, subglabri, in parte inferiore arcte subimbricat m foliosi; folia linearia, 5—6 mm longa et 0.6—0.8 mm lata, acuta, glabra, marginibus vix ciliata. Flores solitarii, pedicellis brevibus, 3—4 mm longis, subglabris, caespitem vix superantibus; sepala ovato-lanceolata, 3 mm longa, trinervia, glabra; petala alba calyce breviora vel subaequilonga late ovata basi in unguem brevem abrupte angustata.

Typus: Oriens Extremus. Ad ripam maris Glacialis ad sinum S. Laurentii. Leg. D. Eschscholtz; in herb. Ac. Sc. URSS conservatur.

Nostra species a *M. verna* (L.) Hiern. caulibus abbreviatis vix 1—2 cm altis, glabritate totae plantae diversa est.

36. *M. pusilla* Schischk. sp. nova.

Perennis, glabra; caules numerosi in caespitem densum humilem 2—3 cm altum aggregati; folia anguste linearia, 3—6 mm longa et 0.6—0.8 mm lata obtusiuscula, uninervia, in parte inferiore caulis collocata, axillis fasciculifera. Flores solitarii pedicellis longiusculis 1—2 cm longis; sepala ovata trinervia, acuta vel acutiuscula, 2.5 mm longa, petala anguste-ovata calyce breviora, basi sensim attenuata, obtusa, capsula calyce longior, fere usque ad basin valvulis tribus dehiscens; semina reniformia, 0.7—0.8 mm longa rubescenti-fusca, sublaevia, nitida.

Hab.: In glareosis ripariis.

Typus: Tjan-Schan. In valle fluminis Kosalaczan. Fl. et fr. 23 VII 1913. Leg. B. Saposhnikov; in herb. Ac. Sc. URSS conservatur.

Appropinquat ad *M. elegantem* Cham. et Schlecht., sed foliis longioribus, 3—6 mm longis (nec 3 mm), seminibus nitidis sublaevibus (nec rugosis) bene differt.

ARENARIA L.

37. *A. macrantha* Schischk. sp. nova.

Perennis, rhizoma repens 3—4 mm crassum; caules non numerosi basi vix adscendentes vel erecti, 10—30 cm alti, in parte inferiore breviter asperulo-puberuli, superne glaberrimi, folia radicalia setiformia, 3—7 cm longa et 0.3—0.5 mm lata, marginibus breviter ciliata, caulina 2.5—8 cm longa et 0.7—1.2 mm lata marginibus aspera, internodiis solito longiora. Inflorescentia corymbosa; pedicelli glaberrimi, 4—20 mm longi, bractae ovato-lanceolatae,

887 majusculae, 6—10 mm longae et 3 mm latae, marginibus late scariousae, apice tenuiter acuminatae; sepala ovato-lanceolata, 6—10 mm longa et 3—4 mm lata, glabra, basi indurata, apice acuminata, late albo-marginata; petala alba, obovata, apice rotundata vel vix retusa, calyce vix vel sesqui longiora, capsula ovata 6—7 mm longa et 3.5 mm lata.

Hab.: In rupestribus.

Typus: Transcaucasia australis. Armenia, prope pag. Takjaltu. 10 VI 1912. Leg. G. Woronow; in Herb. Ac. Sc. URSS conservatur.

Valde affinis *A. holoptea* M. B. et *A. Szowitsii* Boiss. a priore caulibus inferne pubescentibus, a posteriore pedicellis glaberrimis (nec glandulosis) diversa est.

38. *A. polaris* Schischk. sp. nova.

Perennis; rhizoma repens vel adscendens, caules floriferi numerosi, 10—15 cm alti, glabri, unacum turionibus sterilibus caespitem laxum formantes; folia turionum setacea 3—7 cm longa, marginibus glabra vel indistincte aspera, folia caulina 1.5—2.5 cm longa et 0.8—1.5 mm lata, non raro violaceo-colorata, marginibus glabra vel vix aspera, basi in vaginam 3 mm longam per pariam coalita. Inflorescentia pauci (3—7)-flora paniculam corymbosam formans; pedicelli 4—20 mm longi, glabri, bractee lanceolatae, scariousae, vulgo violaceo-coloratae; sepala late ovoidea, 3 mm longa, late scarioso-marginata, dorso violaceo-colorata; petala alba calyce duplo longiora.

Hab.: In arenosis ripariis zonae arcticae.

Typus: Sibiria arctica. Peninsula Taimyr, ad ripam fl. Dudypty. 18 VIII 1935. Leg. A. Vinogradova; in Herb. Ac. Sc. URSS conservatur.

Nostra species *A. graminifoliae* Schrad. valde affinis, sed caulibus minoribus, foliis radicalibus brevioribus, sepalis violaceo-coloratis sat differt.

MOEHRINGIA L.

39. *M. elongata* Schischk. sp. nova.

Perennis; rhizoma tenue, ramosum, surculos steriles et caules floriferos edens; rami steriles 10—15 cm longi, brevissime asperulo-pubescentes, densiuscule foliosi, folia ovata vel elliptica 2—2.5 cm longa et 0.8—1.2 cm lata, obtusa vel acutiuscula, breviter puberula, marginibus tenuiter ciliata, nervo medio prominente, lateralibus 5—7 indistinctis, basi sensim angustata, sessilia, internodiis longiora; caules floriferi 1—4, basi adscendentes, vel penduli 40—60 cm longi apice vix ramosi, glabri, tantum superne breviter asperulo-pubescentes, graciles, internodiis 4.5—5 cm longis; folia caulium floriferorum elliptica 5—10 mm longa et 2—4 mm lata, acuta vel obtusa basi in petiolum brevem attenuata, glabra, revoluta, internodiis multo breviora. Flores in apice caulium cyma pauciflorum formantes vel solitarii, pedicellis aspero-puberulis 10—22 mm longis; bractee lanceolato-lineares, 1.5—2 mm longae, herbaceae, marginibus anguste scariousae; sepala late ovata

888 2 mm longa glabra, trinervia, albo-marginata; petala alba obovata calyce duplo longiora; capsula ovata calyce sesquialongior.

Hab.: In saxis rupestribusque umbrosis, muscis tectis.

Typus: Oriens Extremus. Ad fontes flum. Suputinka in ripa sinistra rivuli Solontzovyi. 30 VIII 1935. Leg. T. Samoilova; in Herb. Ac. Sc. URSS conservatur.

A *M. lateriflora* (L.) Fenzl caulibus longioribus (40—60 cm longis), foliis caulium floriferorum foliis turionum sterilibus duplo-quadruplo brevioribus, bracteis tantum marginibus scariosis bene differt.

SILENE L.

40. *S. Prilipkoana* Schischk. sp. nova.

Perennis; in parte inferiore ramosissima et lignescens, suffruticulosa; caules herbacei, 15—25 cm alti, pilis patulis brevibus dense vestiti; folia obovata 12—20 mm longa et 3—8 mm lata, dense breviterque puberula, subtus trinervia, acuminata, basi attenuata. Flores in apice caulis solitarii vel terni, laterales interdum longe pedicellati; bractee lanceolato-lineares, herbaceae; calyx clavatus 12 mm longus et 5 mm latus, decemnervius, nervis prominulis, superne anastomosantibus, inter nervos scarioso-albicans; petala albido-flavescentia calyce sesquialongiora, laminis usque ad dimidium bifidis, lobis oblongis, basi appendicibus parvis ad 1 mm longis instructis; unguis superne auriculato-dilatati staminibuscum glaberrimi; capsula ovata, apice sensim angustata, 9 mm longa et 4 mm lata, carpophorus 3 mm longus, brevissime puberulus; semina triangulari-reniformia, 1 mm longa, dorso tuberculata.

Hab.: In clivis lapidosis.

Typus: Respublica Nachiczewan, prope pag. Achura. Fl. et fr. 20 VI 1934, Leg. L. Prilipko; in herb. As. Sc. URSS conservatur.

Calyce subinflato et habitu appropinquat ad *S. Bornmülleri* Freyn sed foliis spathulatis, brevioribus distinguitur.

41. *S. Kudrjaschevii* Schischk. sp. nova.

Perennis, radix sat crassa, 5—6 mm in diametro, adscendens, pluriceps; caules rite numerosi, erecti vel basi adscendentes, 20—35 cm alti, parte superiore ramosi, fere usque ad apicem pilis patulis breviter pubescentes; folia anguste ovata, 2—4 cm longa, 0.8—1 cm lata, acuminata, basi in petiolum latiusculum attenuata, superiora sessilia, omnia breviter puberula, raro subglabra. Flores in apice caulis et ramulorum solitarii, pedicelli longi glabri vel puberuli; bractee lanceolato-lineares, acuminatae, marginibus ciliatae; calyx cylindricus, 20—25 mm longus, glaber, coriaceus, dentibus alternatim obtusis acutiusculisve; petala albido-flavescentia vel obscure violacea, laminis usque ad $\frac{1}{3}$ bifidis, lobis oblongis, appendices ovati, obtusiusculi, carpophorus glaber, 5 mm longus.

Hab.: Asia media. In juniperetis montis Ak-taz ad meridiem ab oppido Gusar. Fl. 2 VI 1935. Leg. S. Kudrjashev; in herb. Ac. Sc. URSS conservatur.

Nostra species valde affinis *S. bucharicae* M. Pop., sed calycibus brevioribus, foliis anguste-ovatis (nec lanceolatis) brevioribus, ramulis sterilibus in axillis deficientibus sat differt.

42. *S. Korshinskyi* Schischk. sp. nova.

Perennis, radix crassa multiceps surculos steriles numerosos, caespitem densum pulviniformem formantes et caules paucos floriferos, 10—15 cm altos, inferne glabros, superne pilis simplicibus glanduliferis intermixtis vel tantum glanduliferis obiectos edens, folia turionum linearia vel lineari-lanceolata, 1—3 cm longa et 1.5—2.5 (3) mm lata, glabra, marginibus ciliolata, uninervia, acuta; caulina 3—5-paria, radicalibus similia sed minora inferiora glabra superiora sicut summitates caulium pubescentia; bractee herbicae lanceolatae sub florem insidentes. Flos apice caulis solitarius; calyx cylindrico-clavatus 23—27 mm longus, pilis glandulosis dense tectus; petala albescentia (?), calyce $\frac{1}{3}$ longiora, lamina ad dimidium bifida lobis oblongis apice inaequaliter rotundato-dentatis, basi appendicibus 2 mm longis praedita, unguis superne subauriculati, capsula ovata 10 mm longa carpophoro glabro 15 mm longo; semina reniformia, 1.5 mm longa, indistincte tuberculata vel sublaevia.

Hab.: In rupestribus zonae alpinae.

Typus: Asia media. Montes Alaici in trajectu inter flum. Karakule Maili-su. Fl. et fr. 30 VIII 1895. Leg. Korshinsky.

Nostra species affinis est *S. karaczukuri* B. Fedtsch, sed dimensionibus totae plantae, bracteis sub flore insidentibus (nec deficientibus) abhorret.

43. *S. Bobrovii* Schischk. sp. nova.

Perennis, radix crassa, multiceps, caules numerosi basi adscendentes, 15—25 cm alti, glabri, solito viscosi; folia radicalia lanceolata, 2.3 cm longa et 3—5 mm lata in petiolum laminae subaequilongum gradatim angustata, caulina sessilia marginibus breviter ciliolata. Flores apice caulium in numero 3—5, distantes, recemum laxum formantes in pedicellis 2—20 mm longis, non raro declinati; calyx anguste campanulatus 8 mm longus et 2—3 mm latus, glaber, dentibus triangularibus acutiusculis brevibus; petala (in sicco) lutescenti-fusca, integerrima, oblonga, apice rotundata, calyce subduplo longiora, unguis filamentaque glabri; capsula ovoidea, 8 mm longa, carpophoro glabro, 4 mm longo, semina triangulari-reniformia, tergo sulcata, sublaevia.

Hab.: In declivitatibus siccis regionis subalpinae.

Typus.: Asia Media. Montes Kuhitang, supra pag. Kuhitang, alt. ca. 2600 m. 23 VIII 1928. Leg. E. Bobrov; in Herb. Ac. Sc. URSS conservatur.

Valde affinis *S. trajectory* Kom., sed calyce non inflato, 2—3 mm tantum lato, carpophoro glabro, brevior recedit.

44. *S. polaris* Kleop. sp. nova.

Biennis; caules non numerosi raro solitarii, 25—50 cm alti, basi asperulo-pubescentes, ceterum glabri, simplices vel a basi ramosi; folia radicalia ovoidea, in petiolum brevem attenuata et cum eo 3—5 cm longa et 8—12 mm lata, glabra, vel brevissime asperula, caulina lineari-oblonga, 3—4 cm longa et 1.5—1.6 mm lata, in axillis fasciculifera, rite glabra. Flores in fasciculis laxis paucifloris, inflorescentiam racemoso-paniculatam formantes; pedicelli filiformes 3—10 mm longi, glabri; calyx campanulatus, 3—3.5 mm longus dentibus obtusis; petala lineari-cuneata calyce $1\frac{1}{2}$ — $2\frac{1}{2}$ plo longiora, filamenta flore longiora; capsula ovoidea 4—5 mm longa et 2.5 mm lata, carpophorus 1—2 mm longus, semina reniformia 1 mm longa, dorso tenuiter et obtuse tuberculata.

Hab.: In glareosis ripariis, saxis calcareis et detriticis.

Typus. Prov. Archangelsk (olim). Ad fl. Mesen, prope Ust-Vaschka IX 1905. Leg. R. Pohle; in herb. Ac. Sc. URSS conservatur.

A *S. bacshkirorum* Janisch., cui affinis est, caulibus glabris, petalis calyce $1\frac{1}{2}$ — $2\frac{1}{2}$ plo longioribus diversa est.

MELANDRIUM ROEHL.

45. *M. adenophorum* Schischk. sp. nova.

Perenne; radix crassa, erecta (?); caulis 45 cm altus brevissime molliterque glanduloso-pubescent; folia radicalia ovata vel ovato-lanceolata, 2—3 cm longa et 0.6—1 cm lata, acuta, basi in petiolum non longum attenuata; folia caulina media et suprema late-ovata, interdum suborbicularia, sessilia, apice breviter obtusiuscule acuminata, 2—2.5 cm longa et 1.5—2.2 cm lata, breviter puberula. Flores in cymatibus in apice caulis et ramulorum, pedicellis brevibus, 2—5 mm longis glandulosi; calyx cylindrico-clavatus, 11—12 mm longus glanduloso-pubescent dentibus obtusis, petala alba (?) calyce duplo longiora, limbo multifido basi ecoronato; capsula ovoidea 7 mm longa, carpophoro brevi 1.5—2 mm longo.

Typus: Asia Media. Distr. Osch (olim) in loco Oi-tal. Fl. 14 VII 1913. Leg. O. Knorring; in herb. Ac. Sc. URSS conservatur.

Ab affini *M. Fedtschenkoano* (Preobr.) Schischk. pubescentia glandulosa et calycibus minoribus 11—12 mm longis (nec 16—20) distinctum est.

46. *M. erubescens* Schischk. sp. nova.

Perenne; caules 20—70 cm longi, numerosi, erecti, pilis crispulis non dense pubescentes, superne parum ramosi et hinc breviter glandulosi; folia anguste ovata 4—7 cm longa et 1—2.5 cm lata, acuta, septemnervia, marginibus nervisque rigidiuscule ciliata basi angustata, sessilia, axillis saepe ramulis abbreviatis foliosis sterilibus praedita. Inflorescentia racemiformis, ramulis

891 *brevibus paucifloris, secundis, glandulosis, bracteae herbaceae foliis similes sed minores, pedicellii 5—20 mm longi vel flores subsessiles; calyx tubulosus, 14—15 mm longus, dense glanduloso-pubescent, dentibus lineari-subulatis, acutiusculis, fructificatione tempore capsulam amplectens; petala roseo-rubescencia calyce sesquialongiora, limbo ad dimidium bifido lobis oblongis, basi appendicibus binis oblongis 1 mm longis munito, ungues superne dilatati, glabri; capsula ovoidea, 12 mm longa et 6 mm lata, subsessilis.*

Hab.: In clivis lapidosis alt. 1500—2000 m.

Typus: Asia media. Tadshikistania. Hissar. In declivio orientali montium Gasi-Mailik inter fluvios Kafirnigan et Vachsch. Fl. 17 IV 1883. Leg. A. Regel; in Herb. Ac. Sc. URSS conservatur.

Calycibus 14—15 longis, dentibus, calycinis lineari-subulatis, laminis petalorum usque ad dimidium bifidis a *M. ruinarum* M. Pop., cui affine, dignoscitur.

GYPSOPHILA L.

47. *G. ucrainica* Kleop. sp. nova.

Perennis; rhizoma plus minusve longum, repens, caules aliquanti, erecti vel adscendentes, 25—65 cm alti, glabri, in inflorescentia ramosi et hinc glandulosi; folia lanceolata vel lineari-lanceolata, 4—8 cm longa et 4—7 mm lata, glabra, glaucescentia, acuta, inferiora in petiolum plus minusve longum angustata. Flores apice ramorum in corymbum densiusculum aggregati, inflorescentiam corymboso-paniculatam formantes, bracteae late-ovatae apice breviter acutatae, scariosae, 3—4 mm longae et 2—2.5 mm latae, nervo mediano brunnescente, saepe glandulosae; pedicelli 2—4 mm longi, glabri; calyx late-campanulatus, 2—2.5 (3) mm longus, dentibus obtusis scarioso-marginatis; petala (in sicco) alba calyce 1½-plo longiora, obcuneata, apice rotundata, ovarium 14—15-ovulatum.

Hab.: In pinetis.

Typus. Ucraina. In vicinis urbis Kiev in pineto prope pag. Darvitza 9 VIII 1909. Leg. E. Bordzilowski; in Herb. Ac. Sc. URSS conservatur.

Planta facie *G. altissimam* referens, sed foliis lanceolatis vel lineari-lanceolatis, acutis, calyce longiore distincta est.

48. *G. tianschanica* M. Pop. et Schischk. in Ind. sem. Horti Almaa-tensis 2 (1935) 12, descr. brevis (emend.)

Perennis; radix 4—6 mm crassa, suberecta vel adscendens, multiceps, caules floriferos in numero 4—10 basi vix adscendentes, erectos, 45—65 cm altos in inflorescentia ramosos, ramulis erecto-patentibus glandulosis stolonisque steriles numerosos emittens. Folia viridi-glaucescentia, lanceolata vel lineari-lanceolata 4—6.5 cm longa et 2—5 mm lata univenosa, apice obtusata basi angustata, inferiora et stolonum in petiolum plus minusve longum attenuata. Flores pedicellis vix glandulosis, brevibus (2—4 mm longis) in cyma

892 corimbosum congesti, paniculam laxiusculam formantes. Calyx glaber campanulatus vix 2 mm longus usque ad dimidium in dentes ovatos, rotundato-obtusos late albo-scariosos incisus; petala alba calyce duplo longiora, cuneata, apice rotundata vel retusa vel vix emarginata, styli ovario $1\frac{1}{2}$ —2-plo longiores; ovula in numero 12—18, capsula late-ovata, 3—3.5 mm longa, semina orbiculari-reniformia, tenuiter granuloso-striata, 1—1.4 mm longa.

Hab.: In clivis stepposis glareosisque.

Typus: Kasachstania. Alatau Transiliensis. In parte superiore fluminis Czilik, ad fontes rivuli Czokurczak, in stepposis et glareosis, alt. ca. 2300 m. Fl. et fr. 10 VIII 1934. Leg. M. Popov; in Herb. Ac. Sc. URSS conservatur.

Valde affinis est *G. altissimae* L. sed foliis angustioribus, ovario multi (12—18)-ovulato capsulisque majoribus differt.

49. *G. Sambukii* Schischk. sp. nova.

Perennis; tota planta glaberrima, radix 3—5 mm crassa, multiceps, caulibus floriferis et surculis foliosis numerosis; caules 10—20 cm alti, basi adscendentes in inflorescentia ramosi; folia linearia 2—5.5 cm longa et 1 mm lata, acutiuscula, caulina 2—4-paria basi in vaginam brevem coalita. Inflorescentia apicalis corymboso-paniculata, pedicelli 2—5 mm longi, bractee triangulari-lanceolatae, scariosae; calyx campanulatus, 4 mm longus usque ad dimidium quinquepartitus, dentibus obtusis late scarioso-marginatis, ciliatis, plus minusve violaceo-coloratus; petala roseo-violacea calyce 2— $2\frac{1}{2}$ -plo longiora, integerrima. Ovarium 14—16-ovulatum; capsula ovata calyce vix longior; semina reniformi-orbicularia, 1.5 mm longa, dorso acute tuberculata.

Hab.: In calcareis.

Typus: Sibiria Enissejensis. Planities excelsa inter fl. Enissei et Chatanga, ad ripam fl. Medvezhja. Fl. 6. VIII. 1935. Leg. Th. Sambuk; in Herb. Ac. Sc. URSS conservatur.

Facie et florum magnitudine *G. uralensi* Less. valde affinis, differt petalis roseo-violaceis (nec albis), ramis inflorescentiae glaberrimis (nec glandulosis). *G. tenuifoliam* atque primo intuitu mentem vocat, sed calycibus usque ad dimidium partitis (nec ad trientem), petalis intensius coloratis diversa est.

ACANTHOPHYLLUM C. A. M.

50. *A. lilacinum* Schischk. sp. nova.

Dense dumosum erinaceum, 20—25 cm altum, caules herbacei flexuosi, simplices, tantum in inflorescentia ramosi, breviter asperulo-pubescentes, leviter violaceo-colorati; foila subulata, 2.0—3.5 cm longa et 1.2 mm lata supra vix concava, subtus convexa, acerosa, puberula, erecto-patula in axillis fasciculis foliorum abbreviatis instructa. Glomeruli, 1—2.5 cm in diam., breviter pedunculati in corymbum densiusculum congesti; bractee basi ovatae vel anguste ovatae apice subulatae squarroso-patentes subtus crispae puberulae; calyx cylindricus, 7 mm longus, superne violaceo-coloratus, dentibus breviter

893 *lanceolatis* acerosis (1.5—2 mm longis); petala lilacina calyce sesquialongiora, lamina ovoidea, 1.5 mm lata, acuta.

Hab.: In clivis siccis lapidosisque.

Typus: Asia Media. Montes Kopet-dagh, prope pag. Suluklu. 7 VII 1934. Leg. A. Borissova; in Herb. Ac. Sc. URSS conservatur.

Affinis est *A. pungenti* (Bge.) Boiss., sed petalis lilacinis, foliis erecto-patentibus differt.

51. *A. albidum* Schischk. sp. nova.

Basi suffrutescens, valde romosum; caules herbacei, 15—30 cm alti, pilis brevibus dense pubescenti-canescens; folia subuliformia, 2—4 cm longa et 1.5 mm lata, breviter puberula vel subglabra, horizontaliter patentia, acerosa, in axillis fasciculis foliorum brevissimis instructa. Flores apice caulium in capitulis parvis (ad 1.5 cm in diam.), paniculam corymbosam laxam formantibus; calyx tubulosus, 6—7 mm longus, pilis crispulis brevibus pubescens, dentibus subulatis acerosis, ad 1 mm tantum longis, lamina albida basi vix rosea, 1.5 mm lata, apice obtusa.

Hab.: In clivis conglomeratis.

Typus: Uzbekistania. Distr. Margelan (olim), ad septentrionem a pago Kosch-Karczi. Fl. 28 V 1913. Leg. N. Dessjatova; in Herb. Ac. Sc. URSS conservatur.

Appropinquat ad *A. brevibracteatum* Lipsky, sed glomerulis minoribus (1.5 cm diam.), petalis albis (nec roseis), fasciculis axillaribus vix evolutis dignoscitur.

52. *A. subglabrum* Schischk. sp. nova. — *A. Stocksianum* β . *pubescens* Freyn in Bull. Herb. Boiss. 2 sér. II (1903) 568.

Dense dumosum erinaceum, caules numerosi, ramosi, 10—15 cm alti, glabri vel vix asperuli, folia subulato-acerosa, 2—3.5 cm longa et 1.5 mm lata, subglabra, marginibus ciliata, patentia. Glomeruli, 1—3 cm in diametro, breviter pedunculati; bracteae e basi anguste ovata acuminatae, squarrosopatentes, acerosae, marginibus ciliatae subtus asperulo-pubescentes; calyx tubulosus, 7 mm longus, subglaber vel pilis sparsis brevibus crassiusculis vestitus; petala roseo-lilacina, lamina anguste-ovata, 1.5 mm lata, apice acuta vel obtusiuscula.

Hab.: In clivis lapidosis.

Typus: Asia Media. Turcomania. Montes Kopet-dagh. In clivis prope pag. Czuli. Fl. 26 VII 1898. Leg. D. Litwinow; in Herb. Ac. Sc. URSS conservatur.

Appropinquat ad *A. elatius* Bge. et *A. Borczowii* Litw., sed ab utroque calyce longiore, caulibus brevioribus, foliis triangulari-subulatis (nec planis) bene differt.

53. *A. tenuifolium* Schischk. sp. nova.

Radix 6—8 mm crassa, adscendens; caules numerosi, adscendentes, 5—30 cm alti, simplices, brevissime puberuli, pulvinum subglobosum formantes; folia patentia vel interdum reclinata, 4—5 cm longa et 1 mm lata subulato-acerosa, glabra vel vix aspera, in axillis fasciculis abbreviatis dimidium folii attingentibus, raro eo longioribus, instructa. Glomeruli in corymbum 2—6 cm in diam. congesti; bracteae e basi anguste-ovata, subulato-acerosae, apice reclinatae, breviter puberulae, marginibus ciliatae; calyx tululosus, 6—7 mm longus et 1—2 mm latus, breviter pubescens, dentibus lanceolatis subulato-acuminatis vix acerosis 1 mm longis; petala rubescenti-rosea, calyce sesquilingiora, lamina anguste ovoidea, 1.5 mm lata, apice obtusa vel acutiuscula.

Hab.: In clivis aridis.

Typus: Asia Media. Prov. Fergana (olim). Prope Maili-sai. Fl. 2 VI 1878. Leg. Aschurbaev; in Herb. Ac. Sc. URSS conservatur.

Consimilis est *A. stenostegio* Freyn, calycibus brevioribus, glomerulis densis, foliis glabris divertit.

54. *A. turcomanicum* Schischk. sp. nova.

Glabrum, tantum folia et bracteae interdum breviter ciliatae; humile dumoso-intricatum, 25—35 sm altum, caules albescentes; folia subulato-acerosa, 3.5—5 cm longa et 1.5 mm lata supra concava, subtus convexa, axillis fasciculifera. Flores in glomerulos apice caulium ramulorumque; bracteae lanceolatae, squarroso-patentes, acerosae, marginibus ciliatae, calycem subaequant, calyx cylindricus 8—9 mm longus, breviter puberulus vel subglaber; petala roseo-lilacina calyce sesquilingiora, lamina anguste ovoidea, 1.5 mm lata, apice acuta.

Hab.: In clivis lapidosis.

Typus: Asia media. Montes Koret-dagh, prope pag. Vannovskoe. Fl. 16 V 1911. Leg. A. Michelson; in Herb. Ac. Sc. URSS conservatur.

Differt ab *A. subglabro* Schischk. caulibus elatioribus, foliis longioribus, 4—6 cm (nec 2—3.5) longis.

55. *A. Krascheninnikovii* Schischk. sp. nova.

Dense dumosum erinaceum, caules numerosi intricati, 35—40 cm alti foliis cum pilis brevibus patulis vestiti, folia subulato-acerosa, 1.5—3 cm longa et 1—1.2 mm lata, patentia. Glomeruli in diametro 1.5 cm; bracteae lineari-subulatae, reclinatae, acerosae, calyce breviores, pilis crispulis, intricatis, longiusculis, dense vestitae; calyx cylindricus 9 mm longus, crispule glanduloso-pubescens, dentibus acerosis 1 mm longis, petala rosea venis violaceis percursis; lamina ovata, ad 2 mm lata, acutiuscula.

Hab.: In clivis lapidosis.

Typus: Asia Media. Karakalpakia. Sultan-Uiz-Dagh, prope coenobium. Fl. 28 VI 1928. Leg. H. Krascheninnikov; in Herb. Ac. Sc. URSS conservatur.

Ab affini *A. adenophoro* Freyn caulibus longioribus, bracteis calyce brevioribus, indumento minus glanduloso diversum est.

56. *A. aculeatum* Schischk. sp. nova.

Dense dumosum erinaceum, caules a basi ramosi, 10—15 cm alti, asperulo-pubescentes, folia patentia, subulato-acerosa, 1.5—2.5 cm longa et 1 mm lata, asperulo-pubescentia, axillis fasciculifera. Flores in glomerulis, 2.5—3.5 in diam., bractee subulato-acerosae erectae vel vix curvatae, florem superantes, basi dilatatae et hinc crispule villosae, marginibus late scariosae et ciliatae; calyx tubulosus, 9 mm longus, breviter puberulus dentibus lanceolato-subulatis 2 mm. longis; petala albido-rosea, lamina anguste-ovata, 1 mm lata apice acuta.

Hab.: In declivitatibus siccis collium, alt. ca. 360 m.

Typus: Asia Media. Uzbekistania, prope opp. Dzhizak. Fl. 9 VI 1901. Leg. Th. Alexeenko; in Herb. Ac. Sc. URSS conservatur.

Ab omnibus speciebus *Acanthophylli* florum Asiae Mediae bracteis erectis flores superantibus statim dignoscitur.

57. *A. schugnanicum* (Preodr.) Schischk. — *A. Fontanesii* subsp. *schugnanicum* Preobr. in Sched. ad Herb. Ac. Sc. URSS.

Suffrutescens, dense ramosum, 8—15 cm altum, caules foliis cum asperulo-pubescentes; folia subulato-acerosa, patentia, 1—2.5 cm longa et 0.75 mm lata, supra sulcata subtus convexa, axillis fasciculifera. Flores in glomerulis pauci (5—7)-floris in diam. 0.7—1 cm, bractee ovato-lanceolatae, acuminatae vel breviter subulatae, puberulae, marginibus in parte inferiore scariosae, calyce subduplo breviores; calyx oblongo-cylindricus, pilis brevibus dense vestitus, dentibus lanceolatis acuminatis; petala pallide rosea calyce sesquialongiora oblongo-spathulata, apice obtusa vel rotundata.

Hab.: In clivis siccis.

Typus: Asia media. Tadshikistania. In valle fl. Seidzh-dary confluvii fl. Schach-dary. Fl. 16 VII 1914. Leg. N. Tuturin et P. Bessedin; in Herb. Ac. Sc. URSS conservatur.

Valde affine *A. glanduloso* Bge, sed foliis brevioribus, tantum 1—2 cm longis, glomerulis minoribus, 0.7—1 cm in diametro, diversum est.

58. *A. elongatum* Preobr. in sched. ad Herb. Ac. Sc. URSS.

Glabrum, glaucescens, caules 35—45 cm alti, tenues, ad 1 mm crassi; folia subulato-acerosa, triangularia, supra plana, subtus convexa, inferiora 3—3.5 cm longa et apud basin 1—1.5 mm lata, media et superiora minora, axillis foliorum inferiorum fasciculifera. Flores in capitulis 12—15 mm in diam., densiusculis; bractee obovatae, 7—8 mm longae et 4 mm latae, tergo rubes-

896 centipurpureae, nervo mediano valde prominente, marginibus late alboscariosae, apice breviter mucronulatae; calyx tubulosus, 7.5—8.5 mm longus et 1.5—2 mm latus, sparsim pubescens, superne rubescenti-purpureus, dentibus obtusis, apice mucrone brevi mollique terminatis; petala roseo-purpurea calyce vix longiora, lamina apice retusa.

Typus: Asia Media. Montes Kopet-dagh. In loco Budzhnurt prope pag. Firjuza. Fl. 14 VII 1884. Leg. A. Nikolsky; in Herb. Ac. Sc. URSS conservatur.

A. serawschanico Golenk. valde affine sed caulibus 35—45 cm altis (nec 10—25 cm), pubescentia subnulla, calyce 7.5—8.5 mm (nec 4—5 mm) longo bene differt.

DIANTHUS L.

59. ***D. Ruprechtii*** Schischk. in Grossh. Фл. Кавк. II (193û) 433, descript. brevis rossica. — *D. carthusianorum* β . *caucasicus* Rupr. Fl. Cauc. (1869) 174.

Perennis, caulis 20—50 cm altus, glaber, simplex, folia radicalia cito. marcescentia, linearia, marginibus vix aspera, 2—2.5 cm longa et 2—5 mm lata, caulina 3—6-paria, linearia, 7—10 cm longa et 2—4 mm lata, glaberrima, 3—7-nervia, acuta, basi in vaginam 10 mm longam per paria coalita, vagina foliorum supremorum non inflata. Flores in capitulum densum pauci (4—6)-florum glomerati, basi foliis duobus capitulum non superantibus vestiti; calyx cylindricus 16—17 mm longus in parte superiore solito coloratus, dentibus acutis; squamae late ovoideae 6—8 mm longae apice saepe retusae vel in mucronem brevem (1 mm longum) abrupte abeuntes, calycis dimidium vel trientem partem obtegentes; petala rubra, lamina suborbicularis, 4—5 mm longa, inaequaliter dentata.

Hab.: In pratis et clivis alpinis subalpinisve.

Typus: Caucasus. Dagestania. VII 1860. Leg. Ruprecht; in Herb. Ac. Sc. URSS conservatur.

Similis est *D. cartusianorum* L. sed bracteis longioribus basin dentium calycis vel ejus apicem attingentibus, laminis petalorum angustioribus minoribusque distinguitur.

60. ***D. kirghizicus*** Schischk. sp. nova.

Perennis, caules fere a basi ramosi, 15—30 cm alti, grabri; folia turionum sterilius radicalium anguste linearia 2.5—3 cm longa et 1 mm lata, glauca, marginibus aspera, acuta saepe longitudinaliter complicata, folia caulina eis similia, 1—1.5 mm lata, rite plana, basi per pariam in vaginam brevem (1—2 mm longam) coalita. Flores solitarii vel in numero 2—3 in apice ramulorum, inflorescentiam laxam corymboso-paniculatam formantes; calyx cylindricus, 12—15 mm longus et 2—3.5 mm latus, viridescens dentibus lanceolatis, acutis, marginibus scariosis ciliatulisque; squamae coriaceae, quaternae, ovatae, marginibus scariosae, acutae, trientem tubi calycini obte-

897 gentes, petala albo-rosea (?), limbus oblongus, 5—6 mm longus et 2 mm latus, superne barbulatus apice acute et profunde dentatus.

Hab.: In glareosis ripariis).

Typus: Kirghizia. Prope stationem viae ferrae Dzhelal-abad, ad ripam fl. Kugart. Fl. 4 VIII 1920. Leg. N. Androssov; in Herb. Ac. Sc. URSS conservatur.

D. ramosissimo Pall. et *D. pallidifloro* Ser. affinis, sed ab utroque foliis brevioribus, 2—3 cm longis (nec 3—6 cm), squamis acutis, nec in mucronem transeuntibus, abhorret.

61. *D. inamoenus* Schischk. sp. nova.

Perennis, caules basi adscendentes 10—45 cm alti, in parte inferiore foliis breviter asperulo pubescentes, superne glarbi, folia linearia, 3—7 cm longa et 1—3.5 mm lata, acuta, 5—7-nervia, basi in vaginam 2 mm longam coalita, marginibus aspera. Flores solitarii in apice caulis et ramorum paucorum; calyx cylindricus, apice attenuatus, 14—16 (18) mm longus; squamae 4, coriaceae, late-obovatae, breviter mucronulatae, calycem arcte amplexantes et $\frac{1}{3}$ ejus attingentes, petala flavido-viridiscientia, obovata, 5—10 mm longa et 2—4 mm lata, apice inaequaliter obtuse dentata.

Hab.: In declivitatibus lapidosis.

Typus: Georgia. Tbilissi (Tiflis) in declivitatibus ad fl. Vera. Fl. 26 V 1918 Leg. B. Schischkin; in Herb. Ac. Sc. URSS conservatur.

Valde affinis *D. Marshallii* Schischk. sed pubescentia partis inferioris caulis, laminis petalorum longioribus, 5—10 mm longis (nec 4—5 mm) recedit.

62. *D. tianschanicus* Schischk. sp. nova (Sect. *Fimbriati* Boiss. Fl. Or. I (1867) 480).

Perennis, radix crassa multiceps; caules numerosi basi vix adscendentes vel erecti 15—25 cm alti, superne vulgo ramosi ramulis paucis strictiusculis, raro simplices, laeves; folia anguste-linearia, 2—3.5 cm longa et 0.5—1 mm lata, acuta, glabra, uninervia, basi in vaginam 0.5—1 mm longam coalita. Flores solitarii, bini vel terni, raro numerosiores; calyx cylindricus ad 18 mm longus dentibus lanceolatis acuminatis margine anguste membranaceis; bracteae scariosae ovatae in aristam herbaceam abrupte attenuatae, calycem trientem cingentes. Lamina rosea vel purpurea, oblonga, in lacinias capillaceas latitudine areae multo longiores multifida; capsula calycem aequans, semina oblonga 3 mm longa et 1.5 mm lata.

Hab.: In clivis siccis et glareosis ripariis.

Typus: Tjan-Schan orientalis. Ad ripam fluminis Tekes non procul a pago Kapkak. Fl. 13 VII 1934. Leg. B. Schischkin; in Herb. Ac. Sc. URSS conservatur.

Appropinquat ad *D. crinitum* Sm. et *D. Kuschakewiczi* Rgl. et Schmalh., sed ab utroque differt calyce brevior 18 mm (nec 25—35 mm) tantum longo, lamina purpurea (nec alba vel rosea).

63. *D. seravschanicus* Schischk. sp. nova.

Perennis, basi lignescens; caules numerosi, erecti 35—50 cm alti, glaucescenti-virides, fere a dimidio ramosi, rami oblique sursum adscendentes, inferne breviter asperuli, superne glaberrimi, folia linearia 2.5—5 cm longa et 1—3 mm lata, acuminata, glabra, trinervia, basi in vaginam 1—3 mm longam per pariam coalita. Flores in pedicellis brevissimis in apice ramulorum bini, terni aggregati, raro solitarii, inflorescentiam laxam paniculiformem formantes; calyx cylindricus, superne angustatus, 15—20 mm longus et 2.5 mm latus dentibus acuminatis, squamae senae vel octonae (raro quaternae) ovoideae in mucronem brevem abrupte abeuntes, dimidium vel trientem calycis obtegentes; petala albida (?), lamina fimbriato-multifida.

Hab.: In clivis siccis aridis.

Typus: Asia media. Alpes seravschanici, in declivitatibus aridis prope pag. Kschtut, alt. ca. 1550 m. Fl. 19 VII 1913 n° 161. Leg. J. Bornmüller; in Herb. Ac. Sc. conservatur.

Ab affinibus speciebus seriei *Criniti* nostra planta floribus in apice caulium ramorumque in pedicellis brevissimis binis-ternis conjugatis, fasciculos subsessiles bi- vel trifloros formantes bene differt.

64. *D. karataviensis* N. Pavl. sp. nova.

Perennis, caules basi adscendentes, 20—35 cm alti, ramosi, glabri, vel in parte inferiore asperuli; folia linearia, 2—4 cm longa et 1—2.5 mm lata, surculorum sterilium plus minusve asperula, caulina rite glabra. Flores solitarii vel raro bini in apice caulis et ramorum, paniculam laxam formantes; calyx oblongo-cylindricus in parte superiore paulum constrictus, 12.5—16 mm longus, glaber dentibus ovato-lanceolatis acutiusculis, vix asperulis, marginibus anguste scariosis et tenuiter ciliatis; squamae 4—6 (8) coriaceae, ovatae, scarioso-marginatae et ciliatae, apice breviter acuminatae vel acutae calycis trientem partem vel dimidium obtegentes; petala roseo-purpurea, lamina oblonga usque ad dimidium fimbriato-multifida lobis linearibus, ebarbulata.

Hab.: In rupestribus et clivis siccis stepposis.

Typus: Asia media. Montes Karatau, in trajectu Kulan. 8 VII 1931. Leg. N. Pavlov; in Herb. Universitatis Mosquensis, cotypus in Herb. Ac. Sc. URSS conservantur.

Ab omnibus speciebus seriei *Criniti* calycibus brevibus 12.5—16 mm longis statim dignoscitur.

65. **D. soongoricus** Schischk. sp. nova. — *D. crinitus* Kryl. Fl. sib. occid. V (1931) 110, non Sm.

Perennis, caules solito numerosi, 10—30 cm alti, caespitem formantes, simplices vel superne ramosi, inferne breviter asperuli vel tota planta glabra; folia anguste linearia 1—3 cm longa et 0.5—1 mm lata, acuta. Flores solitarii apice caulis et ramorum paucorum (2—3); calyx cylindricus 20—30 mm longus et 3—4 mm latus dentibus lanceolatis acutis; squamae quaternae, oblongo-ellipticae, scarioso-marginatae, apice vulgo sensim acuminatae, raro in mucronem brevem abeuntes, trientem vel quartam partem calycis obtegentes; petala fusco-rubra vel albida, sicco saepe fusciscentia, lamina 10 mm longa fere usque ad basin fimbriato-multifida lobis filiformibus; capsula cylindrica calycem subaequans, semina elliptica 3 mm longa et 1.5 mm lata tenuiter marginata.

Hab.: In semidesertis arenosis lapidosisque, in clivis siccis.

Typus: Kazachstan. Distr. Zaissan (olim), prope pag. Kenderlyk. Fl. 2 VI 1914. Leg. B. Schischkin; in Herb. Ac. Sc. URSS conservatur.

D. turcomanico Schischk. valde affinis, sed caulibus basi non lingnescentibus, foliis anguste linearibus, laminis petalorum fere usque ad basin multifidis sat differt.

66. **D. turcomanicus** Schischk. sp. nova.

Perennis, basi suffrutescens; caules numerosi, 10—50 cm alti, tenuiter asperulo-pubescentes vel fere glabri, glaucescentes, simplices vel ramosi; folia linearia 1—6 cm longa et 1—2 mm lata, acuta, trinervia, inferiora brevissime pulverulente-tomentosa, suprema glabra. Flores solitarii in apice caulis et ramorum paucorum; calyx tubulosus 25—32 mm longus et 4—5 mm latus, apice vix costrictus, dentibus lanceolatis acuminatis (8—10 mm longis) marginibus anguste scariosis ciliatisque, squamae quaternae raro senae, ovatae, acutae vel breviter acuminatae, scarioso-marginatae, trientem calycis obtegentes petala albido-rosea, lamina usque ad dimidium fimbriato-multifida, ebarbulata, pars interga laminis ovata 7 mm longa et 3 mm lata.

Hab.: In saxosis, rupestribus et detriticis.

Typus: Asia media. Turcomania. Montes Kopet-dagh, prope Cheirabad. Fl. 9 VII 1898. Leg. D. Litwinow; in Herb. Ac. Sc. URSS.

Valde affinis *D. pulverulento* Stapf, sed calyce glabro (nec pulverulente-scabro), squamis trientem calycis obtegentibus (nec dimidium) sat differt.

67. **D. tetralepis** Nevski sp. nova.

Glaber, glaucus, basi suffrutescens, caulibus stricte ramosis paucifloris, foliis laevibus vel vix asperulis strictis lineari-subulatis, inferioribus 1—3 cm longis 1—2 mm latis, superioribus 0.5—1.2 cm longis ca. 1.75 mm latis, squamis (bracteis) quaternis adpressis late lanceolatis vel elliptico-lanceolatis subito acuminatis calyce 3—4 $\frac{1}{2}$ -plo brevioribus marginibus membranaceis

900 interdum violaceo-coloratis, exterioribus 0.75—0.9 cm longis ca. 3 mm latis, interioribus 0.9—1.1 cm longis. 3.5 mm latis, calycibus longe cylindraceis 3—3.5 cm longis quinquedentatis dentibus lineari-lanceolatis vel linearibus acutissimis vel acutis, lamina pallide vel pallidissime rosea obovato-oblonga in lacinias capillaceas profundissime multifida basi in unguem longissimum sensim attenuata.

Hab.: In rupibus calcareis.

Typus: Asia Media, ad basin jugi Kuhitang prope pagum Kuhitang, 2 VI 1934 n° 1. Leg. S. Nevski; in Herb. Ac. Sc. URSS conservatur.

Differt a *D. crinito* Sm. et *D. Kuschakeviczii* Rgl. et Schmalh. squamis quaternis acuminatis, nec in cuspidem abrupte attenuatis.

INDEX ALPHABETICUS

Ordinum, familiarum, specierum atque synonymorum plantarum
in tomo VI Florae URSS commemoratarum

	Pag.		Pag.
Acanthophyllum C. A. M.	780	<i>stenostegium</i> Freyn	788
<i>acerosum</i> Sosn.	791	<i>Stocksianum</i> C. <i>pubescens</i> Freyn	787
<i>aculeatum</i> Schischk.	791	<i>subglabrum</i> Schischk.	787
<i>adeno horum</i> Freyn	789	<i>tadshikistanicum</i> Schischk.	801
<i>albidum</i> Schischk.	787	<i>tenuifolium</i> Schischk.	787
<i>Alexandrae</i> Smirn.	795	<i>transhyrcanum</i> Preobr.	800
<i>Borseczowii</i> Litw.	792	<i>turcomanicum</i> Schischk.	789
<i>bracteatum</i> subsp. <i>elongatum</i> Preobr.	796	<i>versicolor</i> Fisch. et Mey.	799
<i>brevibracteatum</i> Lipsky	784, 790	Achyranthes L.	367
<i>Bungei</i> (Boiss.) Trautv.	800	<i>bidentata</i> Blume	367
" var. <i>latifolia</i> Trautv.	800	<i>Acutiflorae</i> Fenzl, sect.	500
<i>coloratum</i> (Preobr.) Schischk.	799	<i>Adenarium</i> Rafin.	516
<i>elatus</i> Bge.	792	<i>peploides</i> Rafin.	517
<i>elongatum</i> Preobr.	796	<i>Adenonema</i> Bge.	419
<i>Fontanesii</i> subsp. <i>schugnanicum</i> Preobr.	795	<i>Adenonema</i> (Bge.) Fenzl, sect.	419
<i>glandulosum</i> Bge.	794	<i>petraeum</i> a. <i>alpinum</i> Bge.	419
" var. <i>roseum</i> Bornm.	794	" β . <i>Cherleriae</i> Bge.	420
" var. <i>tomentellum</i> Freyn et		" a. <i>fasciculatum</i> Bge.	420
Sint.	794	<i>Adenophora</i> Iljin, sect.	285
<i>gypsophiloides</i> Rgl.	801	Aellenia Ulbrich	270
<i>Knorringianum</i> Schischk.	794	<i>auricula</i> (Moq.) Ulbrich	270
<i>Korolkowii</i> Rgl. et Schmalh.	795	<i>Agatophyton</i> Moq., genus	51
<i>Korshinskyi</i> Schischk.	789	(Moq.) Benth., sect.	51
<i>Krascheninnikovii</i> Schischk.	790	<i>Agatophytum Bonus Henricus</i> Moq.	52
<i>latifolium</i> Lipsky	792	Agriophyllum M. B.	158
<i>lilacinum</i> Schischk.	787	<i>arenarium</i> M. B.	159
<i>microcephalum</i> Boiss.	793	<i>lateriflorum</i> (Lam.) Moq.	160
<i>mucronatum</i> C. A. M.	793	<i>latifolium</i> Fisch. et Mey.	161
<i>paniculatum</i> Rgl.	800	<i>minus</i> Fisch. et Mey.	161
<i>paniculatum</i> β . <i>gypsophiloides</i> Golenk.	801	<i>Paletzianum</i> Litw.	161
<i>pulchrum</i> Schischk.	791	<i>pungens</i> Link	159
<i>pungens</i> (Bge.) Boiss.	784	<i>pungens</i> Vahl	159
<i>pungens</i> β . <i>glabriusculum</i> Rgl.	792	<i>squarrosus</i> Moq	159
" var. <i>squarrosus</i> Golenk.	783	<i>Tournefortii</i> Fisch.	160
<i>recurvum</i> Rgl.	792	Agrostemma L.	574
<i>schugnanicum</i> (Preobr.) Schischk.	795	<i>apetalum</i> Don.	716
<i>serawschanicum</i> n Golenk.	796	<i>coronaria</i> L.	699
<i>serawschanicum</i> f. <i>coloratum</i> Preobr.	799	<i>Flos Cuculi</i> G. Don.	700
<i>sordidum</i> Bge.	793	<i>fulgens</i> Doll.	696
<i>spindens</i> Freyn	793	<i>githago</i> L.	575
<i>spinosum</i> C. A. M.	784, 792	" var. <i>ramosa</i> Lindb.	575
<i>squarrosus</i> Boiss.	783	" var. <i>simplex</i> Lindb.	575

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** [Russian page numbers appear in the left-hand margin of the text.]

	Pag.
Agrostemma <i>linicola</i> Terech.	575
<i>saxatile</i> Don	723
Aizoaceae A. Br.	374
Aizoon L.	376
<i>hispanicum</i> L.	376
Albersia <i>blitum</i> Kunth	366
" <i>deflexa</i> Woron.	366
Aleuranthus Iljin, sect.	256
Alexandra Bge.	198
<i>Lehmanni</i> Bge.	197
Allionia Loebl.	370
<i>nyctaginea</i> Mich.	371
Allochrusa Bge.	799
Allochrusa (Bge.) Schischk., subgenus	799
<i>Bungei</i> Boiss.	800
<i>taashikistanica</i> Schischk.	801
<i>versicolor</i> Boiss.	799
Alsinanthe Fenzl, sect.	507
<i>biflora</i> Rechb.	516
<i>stricta</i> Rechb.	507
Alsinanthus Rechb.	507
Alsine Gaertn.	482
Alsine L.	562
<i>aizoides</i> Boiss.	509
<i>Akinfiwii</i> Schmalh.	490
<i>arctica</i> Fenzl	515
<i>arvensis</i> var. <i>maxima</i> G. F. W. Mey.	552
<i>Biebersteinii</i> Rupr.	500
<i>biflora</i> Wahlb.	516
" <i>β. carnosula</i> Fenzl	516
<i>Billardieri</i> Boiss.	489
<i>borealis</i> Britt.	404
" <i>alpestris</i> Britt.	404
<i>breviflora</i> Gilib.	487
<i>brevis</i> Boiss.	489
<i>caucasica</i> Boiss.	490
" Rupr.	509, 510
<i>ciliata</i> Schmalh.	509, 510, 514
<i>condensata</i> Presl	499
<i>costata</i> Fenzl	505
<i>crassifolia</i> Britt.	402
<i>diantha</i> Guss.	557
<i>dianthifolia</i> Boiss.	499
<i>elegans</i> Fenzl	508
<i>glauca</i> Britt.	406
<i>globulosa</i> Fenzl	489
<i>glomerata</i> Fenzl	492
" <i>β. brevibracteata</i> Fenzl	492
" <i>γ. echinosperma</i> Fenzl	492
" <i>α. longibracteata</i> Fenzl	492
<i>gracilipes</i> Kom.	502
<i>graminea</i> Britt.	405

	Pag.
<i>granuliflora</i> Fenzl.	494
<i>hirsuta β. denudata</i> Fenzl	499
" <i>γ. vestita</i> Fenzl	496
<i>hispanica</i> Fenzl	481
<i>holostea</i> Britt.	402
<i>humifusa</i> Brtt.	403
<i>hybrida</i> Jord.	488
<i>imbricata</i> (M. B.) C. A. M	510
" C. A. M.	514
" var. <i>inamoena</i> Boiss.	514
<i>inamoena</i> C. A. M.	514
<i>intermedia</i> Boiss.	491
<i>juniperina ε. lineata</i> Boiss.	503
<i>juniperina</i> Schmalh.	504
" var. <i>lineata</i> Zelen.	504
<i>laricina</i> Crantz	513
<i>lineata</i> Boiss.	503
<i>macrocarpa</i> Fenzl	513
<i>marginata</i> Fenzl	505
" Schreb.	555
" Rechb.	557
" C. A. M.	557
<i>media</i> L.	395, 482
<i>Meyeri</i> Boiss.	489
<i>Michauxii α. erecta</i> Rgl.	502
<i>Michauxii</i> Fenzl	502
<i>montana</i> Fenzl	490
<i>occulta</i> Fisch.	516
<i>pallida</i> Dumort.	397
<i>paniculata</i> Fenzl	505
<i>pentandra</i> Crantz	555
<i>peplodes</i> Crantz	517
<i>pilifera</i> Turcz.	513
<i>pinifolia</i> auct.	510
" Fenzl	509
<i>recurva</i> All.	499
" <i>α. nivalis</i> Boiss.	499
" <i>β. hirsuta</i> Boiss.	496, 499
" Schmalh.	496
<i>rhodocalyx</i> Alb.	514
<i>Rossii</i> Fenzl	508
" <i>α. corollina</i> Fenzl	508
<i>rubella β. caucasica</i> Rupr.	505
<i>rubra</i> C. A. M.	557
" Crantz	558
<i>rudbarensis</i> Stapf	489
<i>saxatilis</i> Rupr.	493, 495
<i>sclerantha</i> Fisch. et Mey.	491
sect. <i>Minuartia</i> Fenzl	489
sect. <i>Sabulineae</i> Fenzl	487
<i>segetalis</i> L.	562
<i>setacea</i> Mert. et Koch	493

	Pag.
<i>Alsine</i> set. <i>ζ. granuliflora</i> Boiss.	494
" <i>β. psilosperma</i> Fenzl.	493
" <i>γ. pubescens</i> Fenzl.	495
<i>stricta</i> Wahlb.	507
<i>subuniflora</i> Alb.	500
<i>taurica</i> Stev.	503
<i>uensifolia</i> <i>δ. brachypetala</i> Fenzl.	489
" <i>α. genuina</i> Boiss.	488
" <i>α. grandiflora</i> Fenzl.	488
var. <i>Regeliana</i> Trautv.	488
" <i>β. tenella</i> Fenzl.	488
" <i>β. viscosa</i> Mert. et Koch	488
<i>trinervia</i> Crantz	540
<i>aliginosa</i> Britt.	410
<i>verna</i> Wahlb.	505
" var. <i>borealis</i> Rgl.	513
" <i>ϑ. glacialis</i> Fenzl.	506
<i>Wiesneri</i> Stapf	490
<i>Villarsii</i> <i>β. psilosperma</i> Fenzl.	501
" <i>δ. psilosperma</i> lus 1 Fenzl.	503
" <i>β. psilosperma</i> lus 3 Fenzl.	503
" <i>α. trachysperma</i> Fenzl.	501
" var. <i>taurica</i> Gurke	503
<i>viscosa</i> Schreb.	487
<i>Alsineae sperguleae</i> Gren. et Godr.	549
<i>Alsinella biflora</i> Swartz	516
<i>stricta</i> Swartz	507
<i>Alsinopsis</i> Small	482
<i>sajanensis</i> Cockerell	516
Alternanthera Forsk.	368
<i>sessilis</i> (L.) R. B.	368
Amaranthaceae Juss.	354
Amaranthus	356
<i>albus</i> L.	364
<i>angustifolius</i> Lam.	365
<i>angustifolius</i> ssp. <i>polygonoides</i> Thell.	365
" var. <i>silvester</i> Thell.	364
<i>aragonensis</i> Senn.	363
<i>blitoides</i> S. Wats.	363
<i>blitum</i> L.	364
<i>blitum</i> auct.	366
" <i>γ. angustifolius</i> Ldb.	365
" <i>δ. graecizans</i> Moq.	365
" <i>α. sylvestris</i> Moq.	354
<i>caudatus</i> L.	360
<i>caudatus</i> 2 <i>leucospermus</i> Thell.	360
<i>cristatus</i> Noronha	356
<i>cruentus</i> L.	361
<i>deflexus</i> L.	366
<i>graecizans</i> L.	365
" <i>α. normalis</i> O. Ktze.	365

	Pag.
<i>hybridus</i> ssp. <i>cruentus</i> var. <i>paniculatus</i> Thell.	361
<i>leucocarpus</i> S. Wats.	360
<i>leucospermus</i> S. Wats.	360
<i>lividus</i> L.	366
<i>melancholicus</i> <i>β. tricolor</i> Moq.	364
<i>oleraceus</i> L.	366
<i>pallidus</i> M. B.	364
<i>paniculatus</i> L.	361
<i>prostratus</i> Balb.	366
<i>retroflexus</i> L.	362
<i>sylvestris</i> Desf.	364
" <i>β. graecizans</i> Boiss.	365
Thellungianus Nevski	365
<i>tricolor</i> L.	363
<i>viridis</i> Vill.	366
Ambrinia Spach, genus	45
Benth. et Hook, sect.	45
<i>ambrosioides</i> Spach	45
<i>Botrys</i> L.	46
<i>foetida</i> Moq.	47
Ammodenia Patrin	516
<i>peploides</i> (L.) Rupr.	517
" var. <i>oblongifolia</i> Fenzl	517
Anabasis L.	281
<i>Abolinii</i> Iljin	287
<i>affinis</i> Bge.	304
<i>affinis</i> Fisch. et Mey.	286
<i>ammodendron</i> C. A. M.	313
<i>aphylla</i> L.	297
<i>balchaschensis</i> Iljin	299
<i>brachiata</i> Fisch. et Mey.	292
<i>brachylepis</i> D. Dietr.	288
<i>bracteolata</i> Eug. Kor.	297
<i>brevifolia</i> Bge.	286
<i>brevifolia</i> C. A. M.	287
<i>caespitosa</i> Steph.	315
<i>cinerea</i> Moq.	276
<i>clavata</i> Pall.	265
<i>conjugata</i> Hofm.	325
<i>cretacea</i> Pall.	295
<i>depressa</i> Eug. Kor.	288
<i>echinopoda</i> Eug. Kor.	291
<i>Echinus</i> M. B.	266
<i>elatiar</i> (C. A. M.) Schischk.	300
<i>eriopoda</i> (C. A. M.) Benth.	290
<i>ferganica</i> Drob.	291
" f. <i>candelabra</i> Iljin	291
" f. <i>divaricata</i> Iljin	291
<i>florida</i> M. B.	276
<i>foliosa</i> L.	265
<i>foliata</i> Pall.	265

	Pag.
Anabasis glomerata M. B.	351
<i>gypsicola</i> Iljin	299
<i>heteroptera</i> Jaub. et Spach	278
<i>hispidula</i> (Bge.) Benth.	301
<i>iliensis</i> Kor. et Mir.	301
<i>jaxartica</i> (Bge.) Benth.	301
<i>Kareliniana</i> Fenzl	296
<i>Korovini</i> Iljin	300
<i>macroptea</i> Moq.	296
<i>miaradena</i> Iljin	284
<i>monandra</i> Schrad.	276
<i>narynensis</i> Eug. Kor.	285
<i>oppositiflora</i> M. B.	278
<i>oppositifolia</i> M. B.	319
<i>pauciflora</i> M. Pop.	299
<i>Pavlovii</i> Eug. Kor.	286
<i>Pelliotii</i> P. Danguy	285
<i>phyllophora</i> Kar. et Kir.	300
<i>ramosissima</i> Minkv.	289
<i>salsa</i> (C. A. M.) Benth.	288
var. <i>glabra</i> Kar. et Kir.	288
<i>saxaul</i> Fisch.	311, 313
<i>Sieversii</i> Willd.	315
<i>spinosissima</i> L. f.	266
<i>subulifolia</i> Schrenk	300
<i>tatarica</i> Pall.	297
var. <i>β</i> . Pall.	288
<i>Tournefortii</i> Jaub. et Spach	269
<i>Trauschelii</i> Litw.	285
<i>triandra</i> M. B.	318
<i>truncata</i> (Schrenk) Bge.	296
var. <i>Reznitzenkoi</i> Iljin	297
var. <i>se avschanica</i> Iljin	297
<i>turgaica</i> Iljin et Krasch.	286
<i>turkestanica</i> Eug. Kor.	292
<i>wakhanica</i> Pauls.	308
<i>Anchophyllum</i> Iljin, sect.	237
<i>Anserina</i> Dumort.	51
Anthochlamys Fenzl	162
<i>polygaloides</i> (Fisch. et Mey.) Fenzl	165
var. <i>caucasica</i> Iljin	165
var. <i>turkestanica</i> Iljin	165
<i>turcomanica</i> Iljin	165
<i>Apetalae</i> — <i>Scleranthaeae</i> Link	546
<i>Arbuscula</i> Ulbrich, sect.	245
Arenaria L.	517
<i>arctica</i> Stev.	515
<i>asiatica</i> Schischk.	527
<i>austriaca</i> M. B.	500
<i>baicalensis</i> Steud	507
<i>Biebersteinii</i> Schlecht.	525
<i>Brotherana</i> Trautv.	515

	Pag.
<i>calycantha</i> Ldb.	404
<i>campestris</i> All.	558
<i>capillaris</i> Poir.	530
<i>capillaris</i> <i>β. airifolia</i> Rgl.	530
" <i>α. formosa</i> Rgl.	529
" <i>ε. kamschatica</i> Rgl.	530
" <i>δ. nardifolia</i> Rgl.	529
" <i>α. typica</i> Rgl.	530
" var. <i>glabrata</i> (Ser.) Schischk.	531
" var. <i>glandulifera</i> (Ser.) Schischk.	531
" var. <i>Meyeri</i> Maxim.	531
<i>caucasica</i> Ad.	490, 509
" Fernald	490
<i>cephalotes</i> M. B.	521
<i>Cherleriae</i> Fisch.	420
" <i>β. fasciculata</i> Fisch.	420
" var. <i>α. uniflora</i> Fisch.	420
<i>ciliata</i> Ldb.	537
" var. <i>frigida</i> Kjellm. et Lundstr.	537
" var. <i>hamifusa</i> Hartm.	537
" subsp. <i>pseudofrigida</i> Ostenf. et Dahl.	537
<i>costata</i> Bge.	505
<i>cucubuloides</i> C. A. M.	528
<i>cucubuloides</i> Smith	528
" var. <i>glabra</i> Fenzl	529
<i>cylindrocarpa</i> Fernald	537
<i>dahurica</i> Fisch.	529
<i>diandra</i> Guss.	557
<i>dianthifolia</i> Fernald	499
<i>dianthoides</i> Sm.	520
<i>dubia</i> Suter	488
<i>elegans</i> Cham. et Schlecht.	508
<i>feiganica</i> Schischk.	532
<i>filifolia</i> M. B.	525
<i>formosa</i> Fisch.	529
" var. <i>glabra</i> Fenzl	530
" var. <i>glandulosa</i> Fenzl	530
<i>frigida</i> Rupr.	472
<i>glabrata</i> Cham. et Schlecht.	506
<i>glaucescens</i> H. Winkl.	536
<i>globosa</i> Hohenack.	490
<i>globulosa</i> <i>β. nana</i> C. A. M.	489
<i>glomerata</i> M. B.	492
<i>glutinosa</i> M. B.	467
<i>gramnea</i> C. A. M.	526
<i>graminea</i> <i>α. grandiflora</i> Fenzl	526
" <i>β. parviflora</i> Fenzl	527
<i>graminifolia</i> Schrad.	525
<i>graminifolia</i> Trautv.	527
" var. <i>Koriniana</i> Trautv.	525

	Pag.
<i>Arenaria</i> gram. var. <i>ostrina</i> Schichk.	526
<i>grandiflora</i> δ . <i>stolonifera</i> Ser.	501
Griffithii Boiss.	536
<i>gypsophiloides</i> L.	528
<i>halophila</i> Bge.	561
<i>Helmii</i> Bge.	501
<i>Helmii</i> Fisch.	501
<i>heteromalla</i> Pers.	493
<i>hirsuta</i> M. B.	496
<i>hirta</i> var. <i>glabrata</i> Cham. et Schlecht.	506
<i>Holostea</i> Beaupr.	521
<i>holostea</i> M. B.	522
<i>holosteoides</i> Edgew.	480
" var. <i>stellarioides</i> Williams.	481
<i>humifusa</i> (Swartz) Whlb.	537
<i>hybrida</i> Vill.	488
<i>imbricata</i> M. B.	514
<i>insignis</i> Litw.	535
<i>intermedia</i> Fernald	441
<i>junceae</i> M. B.	529
" var. <i>glabra</i> Rgl.	529
<i>karatavica</i> Lipsch.	398
<i>Koriniana</i> Fisch.	525
<i>lapponica</i> Spreng.	507
<i>laricifolia</i> M. B.	509
<i>iaricina</i> Cham. et Schlecht.	513
<i>lateriflora</i> L.	541
<i>laxa</i> Fisch.	501
<i>Laxmannii</i> Fisch.	530
<i>Ledebouriana</i> Fenzl.	535
<i>leptoclados</i> Guss.	539
<i>lineata</i> C. A. M.	503
<i>Litwinowii</i> Schischk.	535
<i>longifolia</i> M. B.	527
<i>lychnidea</i> DC.	528
<i>lychnidea</i> M. B.	530
" var. <i>glabra</i> Alb.	530
<i>lychnidea</i> Turcz.	530
<i>macrantha</i> Schischk.	522
<i>macrocarpa</i> Pursh	513
<i>marginata</i> M. B.	505
" DC.	557
<i>media</i> Pers.	557
" Poll.	555
Meyeri Fenzl.	531
<i>Meyeri</i> Edgew. et Hook.	489
<i>mongolica</i> Schischk.	531
<i>montana</i> β . <i>caucasica</i> Boiss.	490
<i>muscorum</i> Fisch.	515
<i>nardilolia</i> Ldb.	529
<i>norwegica</i> var. <i>humifusa</i> E. Fries.	537

	Pag.
<i>occulta</i> Fisch.	516
<i>oosepala</i> Bordz.	527
<i>otitoides</i> Adams	527
<i>ovalifolia</i> Som. et Lev.	538
<i>paniculata</i> Bge.	505
<i>Paulsenii</i> H. Winkl.	535
<i>pentandra</i> Dufour	487
" Max m.	536
" Wallr.	555
<i>peplodes</i> L.	517
<i>physodes</i> DC.	545
<i>pinifolia</i> M. B.	509, 510
<i>polaris</i> Schischk.	526
<i>polygnaoides</i> β . <i>occulta</i> Ser.	516
<i>Potaninii</i> Schischk.	536
<i>procumbens</i> Rupr.	474
<i>pseudofrigida</i> (Ostenf. et Dahl) Juz.	537
<i>pulchra</i> Willd.	762
<i>purpurea</i> Willd.	739
<i>quadrialvis</i> R. Br.	506
<i>Redowskii</i> Cham. et Schlecht.	538
<i>rigida</i> M. B.	521
<i>rotundifolia</i> M. B.	538
<i>rotundifolia</i> var. <i>colchica</i> Alb.	538
<i>rotundifolia</i> var. <i>flaccida</i> Rupr.	538
<i>rubella</i> Hook.	506
" Whlb.	506
<i>rubicunda</i> Spreng.	739
<i>rubra</i> Pers.	558
" var. <i>campestris</i> L.	558
" var. <i>marina</i> L.	561
<i>rupifraga</i> Fenzl.	546
<i>sajanensis</i> Willd.	516
<i>salina</i> Ser.	561
<i>salsuginea</i> Bge.	557
" Bonnier	557
<i>saxatilis</i> L.	493, 525
<i>scandinavica</i> Spreng.	516
<i>segetalis</i> Lam.	562
<i>sericea</i> Ser.	739
<i>serpyllifolia</i> L.	539
" var. <i>scabra</i> Fenzl.	539
<i>serpyllifolia</i> var. <i>tenuior</i> Koch.	539
<i>serpyllifolia</i> L. var. <i>viscida</i> DC.	539
<i>setacea</i> Fisch.	530
" Thuill.	492
" β . <i>anatolica</i> Syreisz.	495
<i>sibirica</i> Pers.	530
<i>Spergularia</i> Pers., sect.	556
<i>stenopetala</i> Turcz.	516
<i>stenophylla</i> Ldb.	525
<i>Steveniana</i> Boiss.	527

	Pag.		Pag.
Arenaria stricta Wats.	507	<i>argentea</i> Pall.	85
<i>subulata</i> Ser.	530	<i>astracanica</i> Balb.	95
<i>Szovitsii</i> Boiss.	522	<i>Aucheri</i> Moq.	85
<i>Szovitsii</i> Grossh.	522	<i>australasica</i> Moq.	88
<i>tenuifolia</i> δ . <i>hybrida</i> Ser.	488	<i>Belangeri</i> Grossh. et Schischk.	103
" ϵ <i>viscidula</i> Ser.	487	<i>bracteosum</i> Trautv.	93
<i>thymifolia</i> Pursh	403	<i>calotheca</i> (Rafin.) Fries	92
<i>trinervia</i> L.	540	<i>campestris</i> Koch et Ziz.	89
<i>tschuktschorum</i> Rgl.	532	<i>cana</i> C. A. M.	98
<i>turkestanica</i> Schischk.	538	<i>centralasiatica</i> Iljin	102
<i>ucranica</i> Spreng.	525	<i>crassifolia</i> C. A. M.	88
<i>uliginosa</i> Schleich.	507	<i>crassifolium</i> Majewski	87
<i>umbrosa</i> Bge.	542	<i>deltoides</i> Babingt.	91
<i>verna</i> L.	505	<i>desertorum</i> Sosn.	85
<i>villosa</i> Ldb.	505	<i>diffusa</i> Ten.	95
<i>violacea</i> Ldb.	739	<i>dimorphostegia</i> Kar. et Kir.	93
<i>viscidula</i> Thuill.	488	" f. <i>bracteosa</i> (Trautv.) Iljin	93
<i>viscosa</i> Fries	487	<i>erecta</i> Huds.	89
<i>Wallichiana</i> Ser.	539	<i>fera</i> (L.) Bge.	107
Armeriastrum Ser., subgenus	812	<i>flabellum</i> Bge.	105
Armerium Williams, sect.	812	<i>glauca</i> Pall.	104
<i>Arostia altissima</i> Rafin.	750	Gmelini C. A. M.	90
<i>Arthrocnemum caspicum</i> Moq.	169	<i>hastata</i> L.	91
Arthropytum Schrenk	302	<i>hastata</i> var. <i>calotheca</i> Rafin.	92
<i>acutifolium</i> Minkw.	311	" var. <i>heterocarpa</i> Fenzl	93
<i>ammodendron</i> Litw.	313	" var. <i>heterosperma</i> Rgl.	93
" var. <i>acutifolium</i> Minkw.	311	" subsp. <i>littoralis</i> Pons	86
" var. <i>aphyllum</i> Minkw.	312	<i>hastata</i> var. <i>macrotheca</i> Rafin.	92
<i>aphyllum</i> Litw.	312	" var. <i>microtheca</i> Schum.	92
<i>aphyllum</i> (Minkw.) Iljin	312	<i>hastata</i> subsp. <i>patula</i> Pons	88
<i>arborescens</i> Litw.	311	<i>hastata</i> f. <i>salina</i> Wallr.	91
<i>betpakdalense</i> Eug. Kor.	307	" var. <i>salinum</i> Kryl.	93
<i>chinense</i> M. Pop.	241	<i>Hermannii</i> Willemet	84
<i>haloxylon</i> Litw.	312	<i>heterosperma</i> Bge.	93
<i>iliense</i> Iljin	303	<i>hortensis</i> L.	85
<i>Lehmannianum</i> Bge.	304	<i>hortensis</i> subsp. <i>nitens</i> Pons	84
<i>leptocladum</i> M. Pop.	308	<i>incisa</i> M. B.	95
<i>Litwinowii</i> Eug. Kor.	306	<i>laciniata</i> L. p. p.	95
<i>parsicum</i> Sav.-Rycz.	311	" M. B.	94
<i>pulvinatum</i> Litw.	304	" <i>concolor</i> lus. 2 Fenzl	103
<i>Regelii</i> Litw.	309	" <i>diffusa</i> Moq.	95
<i>subulifolium</i> Schrenk	306	" <i>discolor</i> K. Koch	95
<i>wakhanicum</i> (Pauls.) Eug. Kor.	308	" <i>turcomanica</i> Moq.	103
Atriplex L.	77	<i>laevis</i> C. A. M.	87
<i>acuminata</i> W. et K.	84	<i>latifolia</i> Wahlb.	91
<i>agrestis</i> Schur.	88	<i>Lehmanniana</i> Bge.	95
<i>alba</i> Scop.	94	<i>lenticulare</i> C. A. M.	107
<i>amblyostegia</i> Turcz.	85	<i>leptoclada</i> Boiss. et Noë	103
<i>amaranthoides</i> Gmel.	113	<i>littoralis</i> Kryl.	87
<i>ambrosioides</i> Crantz	45	<i>littoralis</i> L.	86
<i>angustifolia</i> Sm.	89	" var. <i>angustissima</i> Kudo	90
<i>aralensis</i> Iljin	105	" var. <i>angustissima</i> Moq.	86

	Pag.		Pag.
Atriplex litt. var. <i>integrifolia</i> Fenzl	86	<i>turcomanica</i> Fisch. et Mey.	103
„ var. <i>marina</i> Smith	86	<i>validum</i> Iljin	90
„ <i>δ. mixta</i> Moq.	89	<i>verrucifera</i> M. B.	104
„ var. <i>patens</i> Litw.	87	<i>virgata</i> Scop.	89
„ var. <i>serrata</i> Smith	86	Atripliceae C. A. M., trib.	74
<i>lucida</i> Desf.	84	Auriculatae Boiss., sect.	656
„ Moench	102	Axyris L.	112
<i>maritima</i> Pall.	86	<i>amaranthoides</i> L.	113
<i>megalotheca</i> M. Pop.	101	<i>caucasica</i> (Somm. et Lev.) Lipsky	115
<i>micranthum</i> C. A. M.	93	<i>ceratoides</i> L.	103
<i>microsperma</i> W. et K.	91	<i>glacialis</i> B. Fedtsch.	114
<i>moneta</i> Bge.	106	<i>hybrida</i> L.	113
<i>nitens</i> Schkuhr	84	<i>pamirica</i> B. Fedtsch.	114
„ subsp. <i>desertorum</i> Iljin	85	<i>prostrata</i> L.	114
<i>nudicaulis</i> Boguslav.	90	„ var. <i>pamirica</i> B. Fedtsch.	114
<i>oblongifolia</i> W. et K.	89	„ var. <i>viridis</i> Iljin	114
<i>obtusata</i> Willd.	91	<i>sphaerosperma</i> Fisch. et Mey.	114
<i>ornata</i> Iljin	97	„ var. <i>caucasica</i> Somm. et Lev.	115
<i>pamirica</i> Iljin	98	<i>tectorum</i> Somm. et Lev.	115
<i>patens</i> (Litw.) Iljin	87	Barbulatum Williams, sect.	822
<i>patula</i> L.	88	<i>Bassia</i> All.	124
„ var. <i>angustifolia</i> Lange	89	<i>divaricata</i> O. Kze.	126
„ var. <i>erecta</i> Lange	89	„ var. <i>mollis</i> Minkw.	126
„ <i>a. halepensis</i> Fenzl	89	<i>eriantha</i> N. Pavl.	124
„ <i>γ. mixta</i> Coss.	89	<i>hirsuta</i> Asch.	127
„ var. <i>oblongifolia</i> Westrl.	89	<i>hyssopifolia</i> Volk.	125
<i>patulum</i> var. <i>tataricum</i> Trautv.	87	<i>iranica</i> Bornm.	131
<i>pedunculata</i> L.	105	<i>latifolia</i> auct.	124
<i>portulacoides</i> Pall.	104	<i>sedoides</i> Aschers.	126
<i>praecox</i> Hülphers	90	<i>Behen</i> Moench	595
<i>procumbens</i> Gundz.	88	<i>Behen</i> (Moench) Bge., subgenus	595
„ Less.	95	<i>vulgaris</i> Moench	596
<i>pungens</i> Trautv.	96	<i>Behenantha</i> Ot.h, sect.	595
<i>rosea</i> L.	94	<i>Belanthera</i> Iljin, sect.	258
„ var. <i>subintegra</i> C. A. M.	95	<i>Belowia</i> Moq.	182
<i>rosea</i> B. Fedtsch.	98	<i>baccifera</i> Moq.	184
<i>Sackii</i> Rostk. et Schmidt	91	<i>paradoxa</i> Bge.	178
<i>salicina</i> Pall.	86	Beta L.	33
<i>schugnanica</i> Iljin	97	<i>ciela</i> Pers.	35
<i>serpyllifolium</i> Bge.	96	<i>escutenta</i> Salisb.	35
<i>sibirica</i> L.	102	<i>foliosa</i> Ehrenb.	35
<i>sphaeromorpha</i> Iljin	94	<i>foliosa</i> Hausskn.	39
<i>tatarica</i> L.	95	<i>hortensis</i> Mill.	35
„ <i>β. campestris</i> Moq.	89	<i>lomatogona</i> Fisch. et Mey.	39
„ var. <i>concolor</i> Fenzl	95	<i>longespicata</i> Moq.	39
„ var. <i>diffusa</i> (Ten.) Gürke	95	<i>macrorrhiza</i> Stev.	39
„ var. <i>dlscolor</i> (Koch) Graebn.	95	<i>maritima</i> L.	34
„ <i>virgata</i> Boiss.	95	<i>perennis</i> (L.) Freyn	34, 35
<i>tatarica</i> Schkuhr	89	<i>Rapa</i> Dumort.	35
<i>thunbergiaefolia</i> Boiss.	105	<i>sativa</i> Bernh.	35
<i>transcaspica</i> Bornm. et Sint.	93	<i>stricta</i> C. Koch	36
<i>triangularis</i> Willd.	91		

	Pag.		Pag.
Beta sulcata Gasp.	35	Botryoides C. A. M., sect.	46
<i>trigyna</i> W. et K.	40	Botrys Aellen et Iljin, subsect.	46
" var. <i>albiflora</i> Bordz.	40	Brachylepis (C. A. M.) Bge., sect.	287
<i>vulgaris</i> L.	35	Brachylepis C. A. M.	287
<i>vulgaris cicla</i> L.	35	<i>elatior</i> C. A. M.	300
<i>vulgaris</i> subsp. <i>cicla</i> (L.) Moq.	35	<i>eriopoda</i> Schrenk	290
" subsp. <i>cicla</i> var. <i>crispa</i> (Tratt.)		<i>ferganica</i> Ulbrich	291
Moq.	36	<i>hispidula</i> Bge.	301
" subsp. <i>cicla</i> var. <i>flavescens</i> DC.	36	<i>humilis</i> Less.	288
" " " var. <i>incarnata</i> Moq.	36	<i>intermedia</i> Kar. et Kir.	300
" " " var. <i>purpurascens</i>		<i>jaxartica</i> (Bge.) Benth.	301
Moq.	36	<i>ramosissima</i> Ulbrich	289
" subsp. <i>cicla</i> var. <i>sulcata</i> (Gasp.)		<i>salsa</i> C. A. M.	288
Moq.	36	<i>truncata</i> Schrenk	296
" subsp. <i>esculenta</i> (Salisb.)		Brachyphylla Iljin, sect.	235
Gürke	35, 36	Brachyphyllon Iljin, sect.	325
" subsp. <i>esculenta</i> var. <i>alba</i> DC.	36	Brezia Moq.	191
" " " var. <i>altissima</i> Rös-		<i>heterophylla</i> Moq.	197
sig.	35, 36	Bryomorpha Kar. et Kir.	545
" subsp. <i>esculenta</i> var. <i>lutea</i> DC.	36	<i>rupifraga</i> Kar. et Kir.	546
" " " var. <i>rosea</i> (L.) Moq.	36	Bucharicae B. Fedtsch., sect.	771
" " " var. <i>rubra</i> (L.) Moq.	36	Buda Adans.	556
" " <i>foliosa</i> (Ehrenb.) Asch. et		<i>ma ina</i> Dumort.	561
Schweinf.	35	<i>media</i> Dumort.	557
<i>vulgaris maritima</i> Moq.	34	<i>rubra</i> Dumort.	558
" <i>perennis</i> L.	34	Buffonia L.	475
" <i>sacharifera</i> Alef.	35	<i>macrocarpa</i> Ser.	476
Beteae Moq., trib.	33	<i>macrosperma</i> Bo ss.	476
Bienertia Bge.	199	" J. Guy	479
<i>cycloptera</i> Bge.	200	<i>Oliveriana</i> Ser.	479
<i>Lipskyi</i> Fomin	200	<i>parviflora</i> Griseb.	476
Blitum L.	48	<i>Sintenisii</i> Freyn	476
<i>ambrosioides</i> Beck.	45	<i>tenuifolia</i> L.	479
<i>Bonus Henricus</i> C. A. M.	52	" M. B.	476
<i>capitatum</i> L.	49	" γ. <i>intermedia</i> Fenzl	476
<i>chenopodioides</i> L.	50	<i>virgata</i> Syr.	476
<i>glaucum</i> Koch	52	Calvelia Moq.	182
<i>Korshinskyi</i> Litw.	49	<i>pterantha</i> Moq.	187
<i>petiolare</i> Link	49	Camphorosma L.	116
<i>polymorphum</i> C. A. M.	50, 53	<i>acuta</i> L.	315
" β. <i>crassifolium</i> Moq.	50	<i>annuum</i> Fenzl	119
<i>rubrum</i> γ. <i>crassifolium</i> Moq.	50	<i>annuum</i> Pall.	118
<i>tataricum</i> Bess.	49	<i>Lessingii</i> Litw.	118
" Mill.	50	<i>monspeliacum</i> L.	117
<i>virgatum</i> L.	48	" var. <i>hirsutissimum</i> Litw.	117
Boottia Neck.	861	" var. <i>pilosum</i> Litw.	117
<i>glutinosa</i> M. B.	863	" f. <i>recurvifolium</i> (Fenzl) Litw.	117
vulgaris Bge.	863		
Borszowia Bge.	199		
<i>aralocaspica</i> Bge.	199		
<i>Titovii</i> Eug. Kor.	199		
Botrydium Spach	46		

	Pag.
Camphorosma monsp. var. <i>typica</i> Trautv.	117
<i>ovata</i> W. et K.	118
<i>perenne</i> Pall.	117
<i>Pteranthus</i> Sibth.	572
<i>ruthenicum</i> C. A. M.	118
" M. B.	117
<i>songoricum</i> Bge.	119
Camphorosmeae Moq., trib.	116
Capitatae Boiss., sect.	745
Capitellatae Schischk., sect.	681
Caroxylon Moq.	248
Thunb.	248
Caroxylon (Thunb.) Iljin, sect.	248
<i>auricula</i> Moq.	270
<i>glaucum</i> Moq.	246
<i>hispidulum</i> Bge.	247
<i>nodulosum</i> Moq.	258
<i>subaphyllum</i> Moq.	245
<i>tamariscinum</i> Moq.	218
Carpophora Hoffmeisteri Klotzsch	711
Carthusianastrum Williams	812
Carthusiani Boiss., sect.	813
Carthusianum Williams	813
Caryophyllaceae Juss.	386
Caryophylleae — Scleranthae Endl.	546
Caryophyllastrum Williams	822
Caryophyllum Ser., subgenus	822
Caryophyllus armerius Moench	812
<i>barbatus</i> Moench	821
Caudicosae A. Gray, sect.	378
Celosia L.	355
<i>argentea</i> L.	355
" <i>a. vera</i> O. Ktze.	355
<i>cristata</i> L.	356
" var. <i>catsreni</i> Thell.	356
" var. <i>eucristata</i> Thell.	356
Centrospermae Engl.	1
Cerastium L.	430
<i>Alexeenkoanum</i> Schischk.	451
<i>alpinum</i> Kom.	455
" M. B.	459
<i>alpinum</i> L.	458
<i>alpinum Beeringianum</i> Rgl.	456
" γ . <i>caespitosum</i> Malmgreen	458
" <i>glabratum</i> Fenzl	458
" var. <i>glandulifera</i> Trautv.	458
" <i>a. hirsutum</i> Fenzl	458
" β . <i>lanatum</i> Fenzl	458
" δ . <i>serpyllifolium</i> Rgl.	459
<i>amplexi aule</i> Sims	444
<i>amurense</i> Ohwi	454
<i>anomalum</i> Waldst. et Kit.	436

	Pag.
<i>araraticum</i> Rupr.	465
<i>argenteum</i> M. B.	464
<i>argenteum</i> M. B. p. p.	464
" ssp. <i>glabratum</i> Sosnowsky	464
" β . <i>minor</i> Freyn et Conrath.	464
<i>armenicum</i> Gren.	443
<i>arvense</i> L.	460
" var. <i>angustifolium</i> Fenzl	463
" " <i>glabellum</i> (Turcz.) Fenzl	463
" " <i>latifolium</i> Fenzl	463
<i>arvense</i> M. B.	441
<i>Beeringianum</i> Cham. et Schlecht.	456
<i>Bialynizokii</i> Tolm.	459
<i>Biebersteinii</i> DC.	463
<i>biflorum</i> Crantz	516
<i>blepharostemon</i> Fisch. et Mey.	448
<i>brachypetalum</i> Fenzl	449
" β . <i>tauricum</i> Kern.	449
" <i>a. viscidum</i> Gren.	449
<i>caespitosum</i> Gilib.	455
<i>carinthiacum</i> Som. et Lev.	460
" var. <i>elegans</i> Som. et Lev.	460
<i>caucasicum</i> Fisch.	443
<i>cerastoides</i> Britt.	435
" var. <i>elegans</i> (Fisch.) Schischk.	436
<i>chewsuricum</i> Som. et Lev.	441
<i>chloifolium</i> Fisch. et Mey.	446
<i>ciliatum</i> Ohwi	454
<i>ciliatum</i> Turcz.	454
<i>collinum</i> Hort.	453, 458
<i>corniculatum</i> Crantz	447
<i>daghestanicum</i> Schischk.	465
<i>dahuricum</i> Fisch.	444
" α . <i>diffusum</i> Som. et Lev.	445
" γ . <i>elatum</i> Som. et Lev.	445
" β . <i>elongatum</i> Gren.	443
" β . <i>holosteam</i> Ser.	443
" var. <i>pilosum</i> Rgl.	444
<i>dentatum</i> Möschl.	451
<i>dichotomum</i> L.	447
<i>Edmonstonii</i> var. <i>caespitosum</i> Anders.	
et Hesselman	456
<i>elegans</i> Fisch.	435
<i>elongatum</i> M. B.	443
<i>falcatum</i> Bge.	439
<i>fimbriatum</i> Ldb.	418
<i>Fischeri</i> Gren.	447
<i>Fischerianum</i> Ser.	457
<i>Fischerianum</i> Tolm.	456
<i>frigidum</i> M. B.	453
<i>furcatum</i> Cham. et Schlecht.	454
<i>glomeratum</i> Thuill.	450

	Pag.
Cerastium glom. var. apetalum (Dum.) Kitt.	450
„ var. corollinum (Fenzl) Rouy et Foucaud . . .	450
„ var. spurium (Posp.) Asch. et Gr. . . .	450
„ b. villosum Schmalh. . . .	466
glutinosum Fries	452
Gorodkovianum Schischk.	457
grandiflorum Boiss.	464
„ var. glabra Trautv.	464
„ a. rosmarinifolium Fenzl . . .	464
hemschinicum Schischk.	445
holosteu. Fisch.	443
hyperboreum Tolm.	458
incanum Ldb.	460
inflatum Link	447
kasbek Parrot	441
latifolium Boiss.	459
„ latifolium β . lanceolatum Fenzl . . .	459
Ledebourianum Ser.	439
lithospermifolium Bge.	439
lithospermifolium Fisch.	441
longifolium Willd.	448
maximum L.	440
„ β . falcatum Gren.	439
maximum var. revolutum (Meinsh.) Schischk. . . .	440
maximum α typicum Rgl.	440
Meyerianum Rupr.	453
microspermum C. A. M.	442
minutum Kom.	468
multiflorum C. A. M.	442
„ salata vica Rupr.	442
„ pyrrhosperma Rupr.	442
nemorale M. B.	444
nemorale β . glabrescens Fenzl . . .	443
„ var. unilaterale Lipsky . . .	443
„ β . villosa Fenzl	444
nitens Stev.	443
obtusifolium Kar. et Kir.	435
oreades Schischk.	445
orothonorum Tatewaki	457
ovatum Boiss.	459
„ α . glabratum Ldb.	459
ovatum β . rutilum Ldb.	459
pallens F. W. Schultz	452
pauciflorum Bge.	441
pauciflorum Stev.	439
pentandrum Krock	450
perfoliatum L.	446
„ var. ciliatum Schischk. . . .	446

	Pag.
pilosum Ldb.	439
polymorphum Rupr.	459
„ a. decumbens Rupr.	459
„ mollifolium Rupr.	459
„ alpestre Rupr.	459
„ myrtifolium Rupr.	459
„ latifolium Rupr.	460
„ viscidulum Rupr.	460
ponticum Alb.	465
pumilum Stev.	452
„ ssp. pallens Schintz et Thell.	452
purpurascens Adams	453
„ var. microspermum Rupr. . .	454
„ var. parviflora Trautv. . . .	453
„ var. tenuicaulis Trautv. . . .	453
„ var. subacaulis Trautv. . . .	453
pusillum Ser.	457
Regelii Ostenf.	458
repens M. B.	463
revolutum Meinsh.	440
Riaei auct.	452
rigidum Ldb.	454
rubescens Mattf.	454
ruderales M. B.	449
ruderales β . macrospermum Rupr. . .	453
rupestre Fisch.	435
salata vica Rupr.	442
saxatile Turcz.	454
schizopetalum H. Winkl.	403
Schmalhauseni Pacz.	452
semidecandrum L.	450
„ β . herbaceo-bracteatum Fenzl . . .	452
„ β . glutinosum Rechb.	452
„ β . pumilum M. B.	452
„ α . scarioso-bracteatum Fenzl 450, 451	
serpyllifolium M. B.	459
Sosnowskyi Schischk.	464
Stevenii Schischk.	466
subsimile Schischk.	460
Szowitsii Boiss.	465
tauricum Spreng.	449
tianschanicum Schischk.	456
tomentosum L.	464
Tournefortii Gren.	446
trigynum Vill.	435
triviale Link	455
umbellatum C. Koch	453
„ var. glutinosum Gürke	468
undulatifolium Som. et Lev. . . .	440
unalaschkense Takeda	457

	Pag.
Cerastium villosum Stev.	436
viscosum L. ex parte	450, 455
vulgatum L. part.	455
„ δ. beeringianum Fenzl	456
„ ε. glaucum Fenzl	454
„ δ. grandiflorum lusus 2 Fenzl	459
„ γ. macrocarpum Fenzl	457
„ α. leiopetalum Fenzl	458
Winkleri briq.	403
Ceratocarpus L.	110
arenarius auct.	111
arenarius L.	110
Caput Medusae Bluk.	111, 112
maritimus Pall.	107
salinus Pall.	106
turkestanicus Sav.-Rycz.	111, 112
utriculosus Benk.	111, 112
Ceratosperrum papposum Pers.	108
Charesia Akinfievii E. Busch	709
Chenolea divaricata Hook. t.	126
Chenopodia C. A. M., sect.	54
Chenopodieae C. A. M., trib.	40
Chenopodina Moq., sect.	177, 182
Chenopodina Moq.	177, 182, 191
altissima Moq.	180
baccifera Moq.	184
Biebersteiniana Moq.	179
filiformis Moq.	193
glaucum Moq.	173
lejosperma Moq.	180
maritima α. vulgaris Moq.	194
microsperma Moq.	188
minima Moq.	183
parviflora Moq.	194
physophora Moq.	190
picnantha C. Koch	276
prostrata Moq.	194
salsa Moq.	191
Chenopodium L.	41
acuminatum Willd.	56
„ f. farinosum Aellen	59
„ f. ovatum (Fenzl) Aellen	59
„ var. ovatum Fenzl	59
„ f. pusillum Fenzl	59
„ var. Vachelii Moq.	59
„ f. virgatum (Moq.) Aellen	59
„ var. virgatum Moq.	59
acutifolium Hook et Arn.	59
„ Sm.	55
album auct.	71
album L.	61
album var. α. Schmah.	63

	Pag.
album ssp. amaranticolor Cost. et Reynier	65
„ var. Borbasii (Murr.) Ludw.	62
„ var. concatenatum auct.	62
„ ssp. ealbum Ludw.	62
„ var. ealbum Ludw.	61
„ ssp. hastatum Murr.	70
„ var. hastatum Klinggräff.	70
„ ssp. Karoi Murr.	69
„ var. Klinggraeffii Abromeit	70
„ var. microphyllum Boenn.	62
„ var. Novopokrovskyanum Aellen	62
„ b. opulifolium G. F. W. Mey.	63
„ var. pseudoficifolium Turcz.	62
„ f. pseudopulifolium J. B. Schulz	68
„ ssp. pseudopulifolium Murr.	68
„ var. pseudopulifolium Abromeit	68
„ var. stenophyllum Makino	62
„ β. striatum Krašan	65
„ var. striatum Krašan	65
„ β. viride Wahlenb.	68
„ × Ch. viride L.	68
altissimum L.	180
amaranticolor Coste et Reynier	65
ambrosioides L.	45
„ ssp. euambrosioides Aellen	46
„ ssp. euambrosioides var. suffruticosum (Willd.) Aellen	46
„ ssp. euambrosioides var. typicum (Spegazz) Aellen	46
angustifolium Gilib.	54
anthelminticum L.	46
arenarium Gaertn.	54
aristatum L.	47
„ var. virginicum (L.) Aellen et Kloss	48
astrachanicum Ldb.	50
atripliciforme Murr.	66
Berlandieri Moq.	70
„ ssp. Zschackei Zobel	71
„ var. Zschackei Murr.	71
Bonus Henricus L.	52
Borbasii Murr.	62
botryoides Smith	50
botrys L.	46
brioniaefolium Bge.	66
„ var. Kapelleriae Aellen	67
capitatum (L.) Aschers.	49
chenopodioides (L.) Aellen	50
„ var. Degenianum Aellen	51
„ var. Degenianum f. glomeratum Aellen	51

	Pag.		Pag.
Chenopodium <i>chenopodioides</i> var. <i>Len-</i>		<i>polyspermum</i> var. <i>acutifolium</i> Beck.	55
<i>gyelianum</i> Aellen	51	" var. <i>cymosum</i> Cheval.	55
<i>chrysomelaspermum</i> Zuccani	60	" <i>a. spicatum</i> Moq.	55
<i>concatenatum</i> auct.	62	<i>pratericola</i> Rydb.	65
<i>crassifolium</i> Hornem.	52	" f. <i>leptophylloides</i> (Murr.) Ael-	
" M. B.	179	len	66
<i>eualbum</i> × <i>Ch. pseudopulifolium</i> Ludw.	68	<i>pratericola</i> f. <i>Thellungianum</i> Aellen	66
× <i>Fursajevii</i> Aellen et Iljin	68	<i>prostratum</i> Bge.	69
<i>ficifolium</i> Bge.	66	<i>pseudopulifolium</i> Murr.	68
" Sm.	71	<i>purpurascens</i> Gadec.	65
<i>filiforme</i> Dum.	193	<i>quinoa</i> Willd.	72
<i>filiforme</i> Moench	180	<i>rhombifolium</i> Mühl.	60
<i>filifolium</i> Fenzl	180	<i>rubrum</i> L.	53
<i>foetidum</i> Schrad.	47	" f. <i>microspermum</i> Litw.	54
<i>foliosum</i> (Moench) Aschers.	48	" var. <i>botryoides</i> Asch. et Gr.	50
" var. <i>hastatum</i> Fenzl	49	" var. <i>glomeratum</i> Wallr.	51
" f. <i>latifolium</i> Fenzl	48	<i>rugosum</i> Aellen	62
<i>frutescens</i> C. A. M.	60	<i>salsum</i> Fenzl	180
<i>giganteum</i> Don.	65	<i>salsum</i> L.	191
<i>glaucum</i> L.	52	<i>Schraderianum</i> Schult.	47
" f. <i>concolor</i> Beck.	53	<i>Schultzeanum</i> Murr.	53
<i>hastatum</i> Murr.	70	<i>scoparium</i> L.	133
<i>hircinum</i> Schrad.	72	<i>serotinum</i> L.	71
<i>hirsutum</i> L.	127	<i>Sosnowskyi</i> Kapeller	66
<i>Hookerianum</i> Moq.	65	" f. <i>viride</i> Kapeller	66
<i>hybridum</i> L.	55	" f. <i>viridi-canescens</i> Kapeller	66
" f. <i>crassiusculum</i> Zapal.	56	<i>stenophyllum</i> Koidzumi	62
" f. <i>crassiusculum</i> Peterm.	56	<i>striatum</i> Murr.	65
" f. <i>subintegrum</i> Moq.	56	" A. <i>Krašani</i> Asch. et Gr.	65
<i>intermedium</i> Mert. et Koch	60	<i>strictum</i> Roth	64
<i>Karoi</i> Aellen	69	" ssp. <i>striatum</i> (Krašan) Aellen et	
<i>Klinggraeffii</i> (Abromeit) Aellen	70	Iljin	65
<i>Korsinskyi</i> Litw.	49	<i>suecicum</i> Murr.	68
<i>lanuginosum</i> Moench.	125	" var. <i>farinosum</i> Murr.	68
<i>leptophyllum</i> auct.	65	<i>urbicum</i> L.	59
" Murr.	62	" f. <i>cymosum</i> Ludwig	60
<i>linifolium</i> Schult.	177	" <i>a. deltoideum</i> Neiler	60
<i>litorale</i> Thunbg.	86	" f. <i>incanum</i> Beck.	60
<i>lucidum</i> Gilib.	55	" <i>a. melanospermum</i> Asch.	60
<i>marginatum</i> Spreng.	55	" f. <i>microspermum</i> Asch. et Gr.	60
<i>maritimum</i> L.	193	" var. <i>intermedium</i> Koch	60
<i>melanospermum</i> Wallr.	60	" var. <i>rhombifolium</i> Moq.	60
<i>microspermum</i> Wallr.	60	" var. <i>vulgare</i> Neiler	60
<i>murale</i> L.	55	<i>Vachelii</i> Hook. et Arn.	59
<i>oppositifolium</i> Willd.	278	<i>villosum</i> Spreng.	179
<i>opulifolium</i> Schrad.	63	<i>virgatum</i> F. Müll.	48
" ssp. <i>orientale</i> Murr.	64	" Thunberg	62
" var. <i>orientale</i> Beck.	64	<i>viride</i> L.	68
<i>pamiricum</i> Iljin	70	" f. <i>farinosum</i> (Murr.) Aellen et	
<i>petiolare</i> var. <i>leptophylloides</i> Murr.	66	Iljin	68
<i>polymorphum</i> β. <i>chenopodioides</i> Fenzl	50	<i>vulvaria</i> L.	67
<i>polyspermum</i> L.	54	" f. <i>microphyllum</i> Moq.	67

	Pag.
Chenopodium vulv. f. rhombicum Murr.	67
<i>Zschackei</i> Murr.	71
<i>Cherleria sibirica</i> Rgl. et Til.	420
<i>Chloranthae</i> Rohrb., sect.	616
<i>Cinnosilene</i> Rohrb., sect.	610
Claytonia Gronov.	377
<i>acutifolia</i> Ldb.	381
<i>acutifolia</i> Pall.	378
<i>arctica</i> Adams	381
<i>Eschscholtzii</i> Cham.	382
<i>Joanneana</i> Roehm. et Schult.	381
<i>sarmentosa</i> C. A. M.	382
<i>sibirica</i> L.	383
<i>tuberosa</i> Pall.	378
<i>Vassilievii</i> Kuzen.	383
<i>virginica</i> a. <i>media</i> Ldb.	378
<i>Cocosalsola</i> Fenzl, sect.	265
<i>Coccyganthe pratensis</i> Rupr.	700
<i>Cochlospermum altissimum</i> Lag.	180
<i>Compactae</i> Boiss., sect.	615
<i>Coniomorphae</i> Boiss.	690
<i>Coniomorpha</i> Otth, sect.	690
<i>Coniosilene</i> Rohrb.	690
<i>Conosilene</i> (Rohrb.) Williams, subgenus	690
<i>Conosperma</i> Iljin, sect.	182
<i>Corallinae</i> Franch., sect.	39
<i>Corispermeae</i> Moq., trib.	135
Corispermum L.	135
<i>algidum</i> Iljin	139, 143
" var. <i>macrospermum</i> Dobroch.	139
<i>altaicum</i> Iljin	148
<i>apterum</i> Korov.	155
<i>aralo-caspicum</i> Iljin	144
" ssp. <i>caucasicum</i> (Bge.) Iljin	145
" " " f. <i>apterum</i> Iljin	145
<i>borystenicum</i> Andr.	138
<i>canescens</i> Kit.	140
<i>chinganicum</i> Iljin	147
<i>coloratum</i> Andr.	146
<i>confertum</i> Bge.	157
<i>crassifolium</i> Turcz.	143
<i>declinatum</i> Steph.	147
" f. <i>apterum</i> Iljin	147
<i>dubium</i> Goldb.	139
<i>Dutreullii</i> Iljin	154
<i>elongatum</i> Bge.	156
" var. <i>intermedium</i> Bge.	157
" var. <i>latifolium</i> Bge.	157
" var. <i>leptopterum</i> Iljin	157
" var. <i>subimmarginatum</i> Bge.	157
" var. <i>tenuifolium</i> Bge.	157
<i>erosum</i> Iljin	150

	Pag.
<i>filifolium</i> C. A. M.	146
<i>gelidum</i> Iljin	156
<i>Henningii</i> Goldb.	139
<i>heptapotamicum</i> Iljin	152
<i>Hilariae</i> Iljin	154
<i>hybridum</i> Andr.	140
<i>hyssopifolium</i> L.	148
<i>hyssopifolium</i> Kryl.	140
<i>hyssopifolium</i> a. <i>microcarpum</i> Neiler	145
" <i>β. nitidum</i> Schmalh.	145
" <i>γ. remotiflorum</i> Fenzl	152
" var. <i>filifolium</i> Schmalh.	146
" var. <i>Marschallii</i> Fiori et Paol.	138
" var. <i>papillosum</i> O. Kze.	155
<i>intermedium</i> auct.	139
" Turcz.	143
" <i>β. Marschallii</i> Schmalh.	138
<i>Komarovii</i> Iljin	143
<i>Korovini</i> Iljin	155
<i>Krylovii</i> Iljin	150
<i>laxiflorum</i> Schrenk	145
" ssp. <i>autumnale</i> Iljin	144
" var. <i>caucasicum</i> Iljin	145
<i>Lehmannianum</i> Bge.	152
<i>macrocarpum</i> Bge.	157
<i>macrospermum</i> Trautv.	157
<i>Marschallii</i> Stev.	138
" f. <i>remotiflorum</i> Iljin	139
" <i>α. floridum</i> lus 1 Fenzl	145
" <i>β. nudiflorum</i> Fenzl	138
" var. <i>angustifolium</i> Iljin	139
" var. <i>floridum</i> lus 3 Fenzl	140
" var. <i>laxiflorum</i> Trautv.	145
<i>microspermum</i> Host	145
<i>mongolicum</i> Iljin	151
<i>nitidum</i> Kryl.	147
<i>nitidum</i> Kit.	145
" f. <i>densiflorum</i> Iljin	146
" f. <i>purpurascens</i> Moq.	145
" var. <i>caucasicum</i> Bge.	145
<i>orientale</i> Lam.	150
" var. <i>Krylovi</i> Schischk. et Serg.	150
" var. <i>mujunkumense</i> Iljin	151
" var. <i>Schrenkii</i> Iljin	151
<i>pamiricum</i> Iljin	153
<i>papillosum</i> (O. Kze.) Iljin	155
<i>piliferum</i> Iljin	151
<i>polygaloides</i> Fisch. et Mey.	165
<i>purpurascens</i> Host	146
<i>Redowskii</i> Fisch.	149
<i>sibiricum</i> Iljin	149
" ssp. <i>amurense</i> Iljin	156

	Pag.
Corispermum sib. ssp. <i>baicalense</i> Iljin	157
„ ssp. <i>jenissejense</i> Iljin	149
<i>squarrosum</i> L.	140
„ var. <i>erosum</i> Kryl.	150
„ var. <i>sibiricum</i> Kryl.	149
„ ssp. <i>monticola</i> Iljin	143
„ ssp. <i>silvicola</i> Iljin	143
„ ssp. <i>uralense</i> Iljin	143
<i>squarrosum</i> M. B.	139
<i>Stauntonii</i> Moq.	157
<i>tibeticum</i> Iljin	153
<i>ulopterum</i> Fenzl	158
Cormosae A. Gray, sect.	378
Cornulaca Del.	350
<i>Korshinskyi</i> Litw.	350
Coronaria L.	699
<i>coriacea</i> (Monch.) Schischk.	699
<i>coronaria</i> Huth	699
<i>flos cuculi</i> (L.) A. Braun	700
<i>tomentosa</i> A. Br.	699
Cucubalus L.	729
<i>acaulis</i> L.	629
<i>angustifolius</i> Mill.	663
<i>baccifer</i> L.	729
„ var. <i>japonica</i> Miq.	729
<i>Behen</i> L.	596, 597
<i>chloranthus</i> Willd.	616
<i>congestus</i> Willd.	654
<i>conoideus</i> Lam.	690
<i>fimbriatus</i> Guldenst.	601
<i>fruticulosus</i> Pall.	646
<i>inflatus</i> Salisb.	596
<i>italicus</i> L.	675
<i>lacerus</i> Stev.	602
<i>latifolius</i> Mill.	596
<i>maritimus</i> Lam.	597
<i>mollissimus</i> M. B.	635
<i>multifidus</i> Ad.	601
<i>multiflorus</i> Ehrh.	617
<i>muscosus</i> Lam.	629
<i>parviflorus</i> Ehrh.	689
<i>Royeni</i> M. B.	710
<i>sibiricus</i> L.	676
<i>spergulifolius</i> Desf.	652
<i>tataricus</i> L.	619
<i>venosus</i> Gilib.	596
<i>viscosus</i> L.	710
<i>wolgensis</i> Willd.	685
Cyclolobeae C. A. M., subfam.	28
Cynocrambaceae	371
Cynocrambe Gaertn.	372
<i>cynocrambe</i> Huth	372

	Pag.
<i>Dioscoridis</i> Bubani	372
<i>prostrata</i> Gaertn.	372
Degenia Aellen, sect.	50
<i>Delia segetalis</i> Dumort.	562
<i>Deriandra</i> Cambess.	545
<i>Diantheae</i> Pax, trib.	730
Dianthus L.	803
<i>acanthoimonoides</i> Schischk.	837
<i>acicularis</i> Fisch.	849
<i>alpinus</i> Ldb.	822
„ 7. <i>repens</i> Rgl.	822
„ var. <i>glacialis</i> Trautv.	823
„ <i>Semenovii</i> Rgl. et Herd.	825
<i>amurensis</i> Jacq.	827
„ f. <i>albiflorus</i> Preobr.	827
<i>Andronakii</i> Woron.	841
<i>Andrzejewskianus</i> (Zapal.) Kulcz.	813
„ subsp. <i>orientalis</i> Kleop.	814
<i>arenarius</i> L.	848
„ var. <i>borussicus</i> Vierh.	848
„ <i>multiflorus</i> Kryl.	849
„ <i>pseudosquarrosus</i> Novak	849
„ subsp. <i>borussicus</i> Kleop.	848
„ subsp. <i>glaucus</i> Kleop.	848
„ subsp. <i>pseudosquarrosus</i> Kleop.	848
<i>armeria</i> L.	812
<i>armeria</i> × <i>D. deltoides</i> Rchb.	860
<i>atrorubens</i> M. B.	813
<i>azkurensis</i> Sosn.	845
× <i>barbato-superbus</i> Lejenne	861
<i>barbatus</i> L.	821
„ f. <i>albus</i>	822
„ f. <i>atrosanguineus</i>	822
„ f. <i>atroviolaceus</i>	822
„ f. <i>auriculiflorus</i>	822
„ f. <i>magnificus</i>	822
„ f. <i>marginatus</i>	822
„ f. <i>occultus</i>	822
„ f. <i>striatus</i>	822
„ var. <i>quadrangulus</i> Bordz.	821
„ × <i>D. superbus</i> L.	861
<i>bicolor</i> Adams	829
<i>bicolor</i> M. B.	839, 841
„ <i>glabratus</i> Rupr.	829
„ var. <i>minor</i> M. B.	841, 842
<i>Borbasii</i> Vand.	820
<i>calocephalus</i> Boiss.	819
<i>campestris</i> Boiss.	829
<i>campestris</i> M. B.	830
„ subsp. <i>pallidiflorus</i> Schmalh.	835
„ subsp. <i>rigidus</i> Schmalh.	836

	Pag.
Dianthus camp. <i>b. scaber</i> Schmalh.	830
<i>canescens</i> C. Koch	854
<i>capitatus</i> Balbisi	813
subsp. <i>Andrzejowskianus</i> Zapal.	813
ssp. <i>eucapitatus</i> Kleop.	813
" <i>rubescens</i> Owerin	814
<i>capitatus</i> Schischk.	813
<i>carbonatus</i> Klok.	830
<i>carthusianorum</i> L.	814
" <i>f. borysthenica</i> Pacz.	820
" <i>β. caucasicus</i> Rupr.	818
ssp. <i>eu-carthusianorum</i> Hegi	814
" var. <i>glomeratus</i> Schmalh.	817
<i>caryophyllus</i> L.	847
<i>caucasicus</i> Smith	825, 826
" M. B.	829
<i>chinensis</i> L.	823
<i>chloroleucus</i> Fisch.	828
<i>cinnamomeus</i> var. <i>glaber</i> Williams	841
<i>collinus</i> auct.	818
" <i>α. imereticus</i> Williams	827
" var. <i>ruthenicus</i> Fisch.	824
ssp. <i>uralensis</i> Fedtsch. et Fler.	836
<i>Conittissae</i> Annae Andr.	824
<i>contortus</i> Rees	854
<i>coronarius</i> Lam.	818
<i>corymbosus</i> Andr.	854
× <i>Courtoisii</i> Reh.	861
<i>crenatus</i> Gilib.	839
<i>cretaceus</i> Ad.	845
<i>crinitus</i> Kryl.	853
<i>crinitus</i> Sm.	850
" γ. <i>crossopetalus</i> Boiss.	850
" var. <i>roseus</i> Schischk.	850
<i>cristatus</i> Preobr.	837
<i>crossopetalus</i> Fenzl	580
<i>Cyri</i> Fisch. et Mey.	860
<i>deltoides</i> L.	839
<i>deltoiaes</i> × <i>D. armeria</i> Zapal.	860, 861
<i>deltoides</i> × <i>D. superbus</i> L.	860
<i>dentosus</i> Fisch	822
<i>discolor</i> Smith	825
<i>elatus</i> Ldb.	833
<i>elegans</i> M. B.	859
<i>elongatus</i> C. A. M.	839
<i>Eugeniae</i> Kleop.	834
<i>eu-ponticus</i> Zapal.	818
<i>fimbricatus</i> M. B.	854
" ζ. <i>canescens</i> Boiss.	854
" <i>stenocalyx</i> Boiss.	855
<i>Fischeri</i> Spreng.	824
<i>floribundus</i> Boiss.	845

	Pag.
<i>fragrans</i> Adams	846
<i>glabriusculus</i> Kleop.	817
<i>Grossheimii</i> Schischk.	838
<i>guttatus</i> M. B.	829
<i>guttatus</i> Falz-Feini Pacz.	829
<i>guttatus</i> Preobr.	828
× <i>Helwigii</i> Aschers.	860
<i>hirtus</i> M. B.	837
<i>Hoeltzeri</i> Winkl.	856
" var. <i>subobtusatus</i> Preobr.	859
<i>humilis</i> Willd.	837
<i>hypanicus</i> Andr.	833
× <i>Jaczonis</i> Aschers	860
<i>imereticus</i> (Rupr.) Schischk.	827
<i>inamoenus</i> Schischk.	842
<i>integerrimus</i> Bge.	846
<i>karataviensis</i> N. Pavl.	852
<i>kirghizicus</i> Schischk.	837
<i>kubanensis</i> Schischk.	828
<i>Kuschakewiczii</i> Rgl. et Schmalh.	851
<i>Kusnezovii</i> V. Markovicz	826
<i>lanceolatus</i> Stev.	839
" <i>f. flexuosus</i> Preobr.	839
" <i>f. glaber</i> Preobr.	839
" <i>f. pubescens</i> Preobr.	839
× <i>Leitgebii</i> Reichardt	861
<i>leptopetalus</i> Boiss.	839
<i>leptopetalus</i> Willd.	840
" var. <i>bicolor</i> B. Fedtsch. et Fler.	841
" ssp. <i>bicolor</i> Schmalh.	841
" ssp. <i>wolgensis</i> Kleop.	840
" ssp. <i>typicus</i> Kleop.	840
<i>libanotis</i> Lab.	848
<i>Liboschitzianus</i> Ser.	845
" β. <i>integerrimus</i> Boiss.	846
" γ. <i>multicaulis</i> Boiss.	846
<i>liburnicus</i> Ldb.	818
<i>macrolepis</i> Boiss.	860
<i>macronyx</i> Fenzl	855
<i>Marschallii</i> Grossh.	842
<i>Marschallii</i> Schischk.	841
<i>membranaceus</i> Borb.	817
<i>meoticus</i> Klok.	835
<i>montanus</i> M. B.	825
" <i>f. imeretica</i> Rupr.	827
" var. <i>densiflorus</i> Som. et Lev.	827
" var. <i>nanus</i> C. A. M.	826
<i>multicaulis</i> Boiss. et Huet	846
<i>ochroleucus</i> Link	828
<i>orientalis</i> Adams	854
<i>pallens</i> M. B.	835

	Pag.		Pag.
Dianthus pallidiflorus Ser.	835	<i>sinensis</i> var. <i>collinus</i> Schmalh.	817
<i>petraeus</i> M. B.	845	" <i>a. pseudobarbatus</i> Schmalh.	818
<i>pineticola</i> Kleop.	824	" v r. <i>repens</i> Trautv.	822
<i>plumarius</i> Ldb.	848	<i>soongoricus</i> S hischk.	853
" <i>b. squarrosus</i> Schmalh.	849	<i>spinosus</i> Desf.	784
<i>polymorphus</i> M. B.	820	<i>squarrosus</i> M. B.	849
<i>polymorphus</i> var. <i>a.</i> Ldb.	820	" var. <i>ucrainicus</i> Kleop.	850
" <i>ζ. calycis dentibus acutis</i>		<i>stenocalyx</i> (Trautv.) Juz.	859
. Ldb.	820	<i>stenocephalus</i> var. <i>glaber</i> Williams	847
" <i>ζ. diutinus</i> Schma h.	820	<i>sterilis</i> Stev.	837
" <i>a. genuinus</i> Schmalh.	820	<i>superbus</i> L.	856
" ssp. <i>bessarabicus</i> Kleop.	820	" var. <i>eurycalyx</i> Trautv.	856
" ssp. <i>diutinus</i>	820	" var. <i>rubicundus</i> Ser.	856
" <i>f. Kitaibelianus</i> Turcz.	820	" ssp. <i>stenocalyx</i> Kleop.	859
" <i>f. orientalis</i> Turcz.	820	" var. <i>stenocalyx</i> Trautv.	859
" <i>f. tauricus</i> Turcz.	820	<i>subulosus</i> Freyn et Conr.	814
<i>pomeridianus</i> M. B.	840	<i>tabrisianus</i> Bienert	854, 855
<i>pratensis</i> M. B.	828	<i>talyschensis</i> Boiss. et Buhse	847
" <i>b. guttatus</i> Williams	829	<i>tataricus</i> Fisch	828
<i>Preobrashenskii</i> Klok.	834	<i>tetralepis</i> Nevski	854
<i>prolifer</i> L.	779	<i>tianschanicus</i> Schischk.	851
<i>pseudarmeria</i> M. B.	812	<i>transcaasicus</i> Schischk.	819
" var. <i>robustus</i> Schischk.	812	<i>Trautvetteri</i> Woron.	823
<i>pseudobarbatus</i> Bess.	818	<i>trifasciculatus</i> Schmalh.	818
<i>pulverulentus</i> Freyn	853	<i>tristis</i> Woron.	841
<i>pulverulentus</i> Stapf	854	<i>turcomanicus</i> Schischk.	853
<i>Raddeanus</i> Vierh.	823	<i>turkestanicus</i> Preobr.	827
<i>ramosissimus</i> Pall.	835	<i>uniflorus</i> Gilib.	848
<i>recognitus</i> Schischk.	851	<i>uralensis</i> Korsh.	836
<i>repens</i> Willd.	822	<i>versicolor</i> Fisch.	824
<i>reticulatus</i> Ldb.	778	<i>villosus</i> Gilib.	812
<i>rigidus</i> M. B.	838	<i>virgineus</i> Habl.	837
<i>Rogowiczii</i> Kleop.	817	<i>Dichodon</i> Bartl.	435
<i>Ruprechtii</i> Schischk.	818	<i>Dichodon</i> (Bartl.) Fenzl, subgenus	435
<i>ruthenicus</i> Roem.	824	<i>anomalum</i> Rehb.	436
<i>saxatilis</i> Pall.	841	<i>Dichoglottis</i> Fisch. et Mey.	772
<i>saxifraga</i> L.	777	<i>Dichoglottis</i> (Fisch. et Mey.) Endl., subgenus	772
<i>schemachensis</i> Schischk.	840	<i>floribunda</i> Kar. et Kir.	775
<i>Seguieri</i> auct.	824	<i>linearifolia</i> Fisch. et Mey.	772
" Ldb.	824	<i>muralis</i> Jaub. et Spach	774
" <i>β.</i> Ldb.	825	<i>spathulifolia</i> Fisch., ...	773
" <i>γ.</i> Ldb.	828	<i>Dichosperma</i> Dumort., sect.	84
" <i>β. montanus</i> Boiss.	825	<i>Diosanthus</i> <i>Armerium</i> St-Lag.	812
" var. <i>repens</i> Glehn	822	<i>Diotis atriplicoides</i> M. B.	106
" <i>h. silvaticus</i> Schmalh.	824	<i>ceratoides</i> Willd.	108
" <i>silvaticus lusus macrosepalus</i>		<i>ferruginea</i> Nees	108
Rgl. et Schmalh.	825	<i>Dondia altissima</i> Druce	180
" var. <i>subaggregatus</i> Alb.	827	Echinopsilon Moq.	124
<i>serawschanicus</i> Schischk.	852	<i>caspicum</i> Lehm.	126
<i>Semenovii</i> (Rgl. et Herd.) Vierh.	825	<i>dasyphyllum</i> Moq.	126
<i>Siemienkiewiczii</i> Bordz.	846		
<i>sinensis</i> auct.	824		

	Pag.
Echinopsilon <i>divaricatum</i> Kar. et Kir.	126
<i>hirsutum</i> (L.) Moq.	127
<i>hyssopifolium</i> (Pall.) Moq.	125
<i>lanatum</i> Moq.	125
<i>molle</i> Fenzl	126
<i>sedoides</i> (Pall.) Moq.	126
<i>Elisanthe</i> Rehb.	704
<i>Elisanthe</i> (Fenzl) Schischk., subgenus	704
<i>Fedtschenkoana</i> Schischk.	705
<i>ferganica</i> Schischk.	706
<i>firma</i> Schischk.	713
<i>noctiflora</i> Rupr.	712
<i>viscosa</i> Rupr.	710
<i>Eremogone</i> Fenzl, subgenus	520
<i>Eremogone</i> Fenzl	520
<i>cephalotes</i> Fenzl	521
<i>cucubaloides</i> Fenzl	528
<i>graminea</i> C. A. M.	526
<i>graminifolia</i> Fenzl	525
<i>gypsophiloides</i> Fenzl	528
<i>holostea</i> Rupr.	522
<i>juncea</i> Fenzl	529
<i>lychnidea</i> Rupr.	530
<i>rigida</i> Fenzl	521
<i>stenophylla</i> Fisch, et Mey.	525
<i>Ericoides</i> Ulbrich, sect.	251, 258
<i>Eryngium lateriflorum</i> Lam.	160
<i>Euacanthophyllum</i> (Boiss.) Schischk., sub- genus	783
<i>Euacanthophyllum</i> Boiss., sect.	783
<i>Euanabasis</i> Bge., sect.	291
<i>Euarthrophytum</i> Iljin, sect.	304
<i>Eublittum</i> Aellen, sect.	48
<i>Eucerastium</i> Boiss.	439
<i>Eucerastium</i> (Boiss.) Pax, subgenus	439
<i>Euherniaria</i> Williams, sect.	567
<i>Euchylaena borysthenis</i> Spreng.	184
<i>physophora</i> Spreng.	190
<i>Eugypsophila</i> Boiss., sect.	747
<i>Euhalogeton</i> Fenzl, sect.	351
<i>Eumelandrium</i> A. Br., sect.	724
<i>Eumelandrium</i> (A. Br.) Schischk., subge- nus	724
<i>Euminuartia</i> (Fenzl) Graebn., sect.	489
<i>Eunychia</i> DC., sect.	565
<i>Eurotia</i> Adans.	108
<i>ceratoides</i> (L.) C. A. M.	108
" " var. <i>deserticola</i> A. Los.	109
" " var. <i>ferruginea</i> Boiss.	108
" " var. <i>pratensis</i> A. Los.	109
" " var. <i>tragacanthoides</i> A. Los.	109

	Pag.
<i>ceratoides</i> (L.) f. <i>angustifolia</i> Fenzl	109
" " f. <i>latifolia</i> Moq.	109
" " f. <i>tenuifolia</i> Moq.	109
<i>Ewersmanniana</i> Stschegl.	109
<i>ferruginea</i> Moq.	108
<i>Eusalsola</i> Fenzl	224
<i>Euscieranthus</i> Pax, subgenus	547
<i>Eusilene</i> (Rohrb.) Pax, subgenus	602
<i>Eustellaria</i> Fenzl, sect.	394
<i>Eustellaria</i> Fenzl, subgenus	394
<i>Eusueda</i> Gr. et Godr., sect.	177
<i>Euthalia</i> Fenzl, subgenus	537
<i>rotundifolia</i> Rupr.	538
<i>serpyllifolia</i> Rupr.	539
<i>Euviscaria</i> Nyman, sect.	576
<i>Euxolus deflexus</i> Rafin.	366
<i>viridis</i> Moq.	366
<i>Excipae</i> Williams, sect.	744
<i>Fimbriati</i> Boiss.	848
<i>Fimbriatum</i> Williams	848
<i>Fimbripetalum</i> Turcz., sect.	418
<i>Flos cuculi</i> Opiz	692
<i>Flourensia</i> Camb.	545
" <i>caespitosa</i> Camb.	
<i>Flox</i> Adans.	692
<i>Fugacia</i> Fenzl, subsect.	448
Gamanthus Bge.	346
<i>barbellatus</i> Bge.	235
<i>ferganicus</i> Iljin	349
<i>gamocarpus</i> (Moq.) Bge.	346
<i>Kelifi</i> Eug. Kor.	348
<i>ovinus</i> Bge.	346
<i>pilosus</i> (Pall.) Bge.	348
<i>Gastrolychnis</i> Rehb.	714
Rupr.	714
<i>Gastrolychnis</i> (Fenzl) Schischk., subgenus	714
<i>Gastrolychnis</i> Pax, sect.	714
Fenzl, sect.	714
<i>affinis</i> Schischk.	719
<i>angustiflora</i> Rupr.	720
<i>baicalensis</i> Schischk.	723
<i>Soczaviana</i> Schischk.	715
<i>sordida</i> Schischk.	715
<i>tristis</i> Rupr.	716
<i>uralensis</i> Rupr.	716
<i>VahlII</i> Rupr.	720
<i>Gastrosilene</i> Wall., subgenus	595
Girgensohnia Bge.	277
<i>diptera</i> Bge.	281
<i>gypsophilloides</i> Bge.	278

	Pag.
Girgensohnia heteroptera Bge.	278
<i>minima</i> Eug. Kor.	278
<i>oppositiflora</i> (Pall.) Fenzl	277
<i>Pallasii</i> Bge.	277
<i>Githago segetum</i> Desf.	575
<i>Glauci</i> Vierh., subsect.	822
Glinus Loebl.	375
<i>lotoides</i> L.	375
Gomphiona L.	369
<i>globosa</i> L.	369
<i>sessilis</i> L.	368
<i>Gouffea holosteoides</i> C. A. M.	480
Gypsophila L.	731
<i>acutifolia</i> Fisch.	757
" <i>β. Gmelini</i> Rgl.	767
<i>agrestis</i> Pers.	774
<i>albida</i> Schischk.	753
<i>alsinoides</i> Bge.	773
<i>altissima</i> L.	750
" <i>β. elongata</i> Bge.	750
" <i>f. glabra</i> Blocki	750
<i>anatolica</i> Boiss. et Heldr.	761
<i>Antoninae</i> Schischk.	744
<i>aretioides</i> Boiss.	744
" <i>β. caucasica</i> Boiss.	745
" var. <i>imbricata</i> Somm. et	
Lev.	745
" ssp. <i>imbricata</i> Bornm.	745
<i>armeniaca</i> Hausskn.	747
<i>aulieatensis</i> B. Fedtsch.	757
<i>bicolor</i> Freyn et Sint.	749
<i>brachypetala</i> Trautv.	770
<i>bucharica</i> B. Fedtsch.	771
<i>Bungeana</i> Dietr.	739
<i>capillipes</i> Freyn et Sint.	754
<i>capitata</i> Fenzl	746
<i>capitata</i> M. B.	745
<i>capituliflora</i> Rupr.	768
<i>cappadocica</i> Boiss. et Bal.	747
<i>cephalotes</i> (Schrenk) Will.	752
<i>collina</i> Stev.	748
<i>dahurica</i> Turcz.	768
" var. <i>angustifolia</i> Fenzl	768
<i>desertorum</i> (Bge.) Fenzl	740
<i>dichotoma</i> Bess.	748
<i>dichotoma</i> Bess. p. p.	775
<i>diffusa</i> Fisch. et Mey.	753
<i>elegans</i> auct.	753
<i>elegans</i> M. B.	764
<i>ericalyx</i> Boiss.	757

	Pag.
<i>fastigiata</i> L.	747
<i>fastigiata β. cephalotes</i> Schrenk	752
" ssp. <i>β. collina</i> Schmalh.	748
<i>Fedtschenkoana</i> Schischk.	770
<i>filipes</i> (Boiss.) Schischk.	775
<i>floribunda</i> Grossh.	776
<i>floribunda</i> (Kar. et Kir.) Turcz.	775
" <i>β. major</i> Boiss.	775
<i>glandulosa</i> (Boiss.) Walp.	738
<i>globulosa</i> Stev.	746
<i>glomerata</i> Adams	745, 746
<i>glomerata</i> Pall.	746
<i>glomerata β. capitata</i> Ser.	745
<i>glomerata</i> var. <i>globulosa</i> Schmalh	746
<i>glauca</i> Stev.	759
<i>Gmelini</i> Bge.	767
" <i>β. dahurica</i> Turcz.	768
" <i>β. caespitosa</i> Turcz.	767
" <i>γ. intermedia</i> Turcz.	767
" <i>α. Patrini</i> Turcz.	767
<i>herniarioides</i> Boiss.	743
<i>heteropoda</i> Freyn	767
<i>hispida</i> Boiss.	770
<i>hydrophila</i> Post.	761
<i>imbricata</i> Rupr.	745
<i>intricata</i> Franch.	771
<i>ixodes</i> Hausskn.	770
<i>Krascheninnikovii</i> Schischk.	751
<i>Yorae</i> Woron.	761
<i>linearifolia</i> (Fisch. et Mey.) Boiss.	772
<i>Lipskyi</i> Schischk.	769
<i>Litwinowii</i> Kos.-Pol.	751
<i>microphylla</i> (Schrenk) Fenzl	740
<i>Meyeri</i> Rupr.	759
<i>modesta</i> Bornm.	767
<i>muralis</i> L.	774
" var. <i>stepposa</i> Schischk.	774
<i>nanella</i> Grossh.	767
<i>pacifica</i> Kom.	768
<i>pamirica</i> P. eobr.	768
<i>paniculata</i> Boiss. p. p.	749
<i>paniculata</i> L.	749
" ssp. <i>bicolor</i> Freyn	749
" <i>effusa</i> Fenzl	749
" <i>β. hirta</i> Grun.	749
" var. <i>latifolia</i> Hohenack.	749
" var. <i>subglandulosa</i> Lipsky	749
<i>Patrini</i> Ser.	767
" var. <i>caespitosa</i> (Turcz.) Schischk.	767
" var. <i>thesifolia</i> (Ser.) Schischk	767
<i>perfoliata</i> M. B.	759
" <i>α. angustifolia</i> Fenzl	760

	Pag.
Gypsophilla <i>perf. β. tomentosa</i> Ser.	759
<i>petraea</i> Fenzl	739
<i>picta</i> Boiss.	776
<i>planifolia</i> H. Winkl.	752
<i>Popovii</i> Preobr.	772
<i>porrigens</i> (L.) Fenzl	776
<i>Preobrashenskyi</i> Czernjak.	769
<i>producta</i> Stapf	764
<i>pseudoverticillata</i> Kom.	743
<i>pulposa</i> Gilib.	747
<i>purpurea</i> Fenzl	739
" Gilib.	774
<i>Raddeana</i> Rgl.	744
<i>repens</i> M. B.	759
<i>robusta</i> Grossh.	761
<i>sabulosa</i> Stev.	760
<i>Sambukii</i> Schischk.	763
<i>saxifraga</i> L.	777
<i>scorzonerifolia</i> Krašan	759
<i>scorzonerifolia</i> Ser.	760
<i>semiglobosa</i> Czernjak.	769
<i>sericea</i> (Ser.) Fenzl	739
<i>serotina</i> Hayne	774
<i>silenoides</i> Rupr.	764
<i>si nulatix</i> Bornm. et Woron.	752
<i>spathalifolia</i> (Fisch. et Mey.) Fenzl	773
<i>sphaerocephala β. cappadocica</i> Boiss.	747
<i>stepposa</i> Klok.	774
<i>Steupii</i> Schischk.	762
<i>Stevenii</i> Fisch.	758
<i>stricta</i> Bge.	778
<i>struthium</i> Fenzl	748
<i>Szowitsii</i> Fisch. et Mey.	754
<i>Szowitsii α. glabrata</i> Fenzl	754
" <i>β. glandulosa</i> Fisch.	772
<i>tenuifolia</i> M. B.	762
" <i>var. gracilipes</i> Woron.	762
" <i>var. squarrosa</i> Schischk.	762
<i>thesiifolia</i> Ser.	767
<i>tianschanica</i> M. Pop. et Schischk.	750
<i>trichotoma</i> Wend.	759
<i>trichotoma var. anatolica</i> Bornm.	761
" <i>α. glabra</i> Fenzl	760
" <i>β. pubescens</i> Fenzl	759
<i>turkestanica</i> Schischk.	743
<i>ucrainica</i> Kleop.	748
<i>uralensis</i> Less.	763
" <i>var. glabra</i> Kryl.	763
" <i>var. typica</i> Kryl.	763
<i>violacea</i> (Ldb.) Fenzl	739
<i>virgata</i> Boiss.	754
<i>xanthina</i> Bornm. et Woron.	770

	Pag.
Hablitzia	32
<i>tamnoides</i> M. B.	32
Hablitziaceae Ulbrich, trib.	32
Hagenia Moench	776
(Moench) A. Br., subgenus	776
<i>porrigens</i> Moench	776
Halanthium C. Koch	340
<i>Aucheri</i> Moq.	348
<i>Belangeri</i> Bge.	343
<i>kulpianum</i> (C. Koch) Bge.	344
" <i>var. roseum</i> Trautv.	345
<i>lanatum</i> Bge.	343
<i>lilacium</i> Bge.	343
<i>Lipskyi</i> Pauls.	345
<i>rariflorum</i> C. Koch	343
" <i>var. Abichii</i> C. Koch	343
" <i>Aucherianum</i> Boiss.	343
" <i>var. Belangeri</i> Boiss.	344
<i>robustum</i> Bge.	343
<i>roseum</i> (Trautv.) Iljin	344
<i>spicatum</i> Bge.	343
Halianthus Fries	516
<i>pevloides</i> Fries	517
Helicilla Moq.	177
<i>altissima</i> Moq.	178
Halimocnemis C. A. M.	329
<i>alternifolia</i> Moq.	319
<i>Beresini</i> Iljin	334
<i>brachiata</i> C. A. M.	325
" Rupr.	236
<i>crassifolia</i> C. A. M.	319
<i>gamocarpa</i> Moq.	346
<i>glaberrima</i> Iljin	335
<i>glauca β. pentandra</i> Fenzl	324
<i>hispida</i> C. A. M.	327
<i>Hohenackeri</i> Presl	325
<i>juniperina</i> C. A. M.	315
<i>Karelini</i> Moq.	331
" <i>var. canescens</i> Pauls.	331
<i>Kirilowii</i> Fenzl	235
<i>Kowalewskii</i> Szegl.	343
<i>kulpiana</i> C. Koch	344
<i>laricifolia</i> Turcz.	239
<i>lasiantha</i> Iljin	336
<i>latifolia</i> Iljin	338
<i>longifolia</i> Bge.	333
<i>macrantha</i> Fenzl	336
" Kar.	315
<i>macrantha</i> Bge.	336
<i>malacophylla</i> C. A. M.	348
" <i>α. hirsuta</i> Fenzl	348
" Kar. et Kir.	235

	Pag.
Halimocnemis mollissima Bge.	334
<i>monandra</i> C. A. M.	317
<i>obtusifolia</i> C. A. M.	233
<i>oppositifolia</i> Eichw.	319
<i>pilosa</i> Moq.	339
<i>pycnantha</i> C. Koch	344
<i>Reznitzenkoana</i> Litw.	236
<i>sclerosperma</i> (Pall.) C. A. M.	332
<i>sibirica</i> C. A. M.	326
<i>Smirnovii</i> Bge.	337
" $\times$ <i>H. longifolia</i> Bge.	338
<i>squarosa</i> Schrenk	325
<i>tianschanica</i> Litw.	236
<i>triandra</i> Moq.	318
<i>villosa</i> A. Beck.	332
" Bge.	339
<i>villosa</i> Kar. et Kir.	333
<i>Volvox</i> C. A. M.	318
Halimus C. A. M., sect.	106
<i>Halimus</i> Wallr.	106
<i>canus</i> Claus	98
<i>pendunculatus</i> Wallr.	106
Halocharis Moq.	327
<i>Abichii</i> C. Koch	343
<i>gamocarpa</i> Moq.	346
<i>hispida</i> (C. A. M.) Bge.	327
<i>kulpiana</i> C. Koch	344
<i>lachnantha</i> Eug. Kor.	329
<i>pycnantha</i> C. Koch	343
<i>turcomanica</i> Iljin	328
Halocnemum M. B.	170
<i>arabicum</i> Spreng.	167
<i>caspium</i> Goeb.	169
<i>caspicum</i> M. B.	169
" Tausch	167
<i>foliatum</i> Spreng.	166
<i>monandrum</i> Georgi	276
<i>strobilaceum</i> (Pall.) M. B.	171
Halogeton C. A. M.	350
<i>arachnoideus</i> Moq.	352
<i>georgicus</i> Moq.	255
<i>glomeratus</i> C. A. M.	451
<i>malacophyllus</i> Bge.	235
<i>monandrus</i> C. A. M.	276
<i>obtusifolius</i> Fenzl	233
<i>oppositiflorus</i> C. A. M.	278
<i>rariflorus</i> Fenzl	343
<i>spinosissimus</i> C. A. M.	266
<i>tibeticus</i> Bge.	352
Halolepis Bge.	168
<i>pygmaea</i> (Pall.) Bge.	169
<i>songorica</i> Bge.	169

	Pag.
<i>strobilacea</i> Cesati, Pass. et Gib.	171
Halostachys C. A. M.	169
<i>caspia</i> (Pall.) C. A. M.	169
<i>soongorica</i> C. A. M.	169
Halotis Bge.	338
<i>occulta</i> Litw.	339
<i>pilosa</i> (Moq.) Iljin	339
Haloxydon Bge.	310
<i>ammodendron</i> Bge.	311, 312, 313
<i>chiwense</i> M. Pop.	241
<i>floridum</i> Fenzl	276
<i>leptocladum</i> Eug. Kor.	308
<i>pachycladum</i> M. Pop.	313
<i>persicum</i> Bge.	311
<i>Regelii</i> Bge.	309
<i>subulifolium</i> Bge.	304, 306
<i>wakhanicum</i> Eug. Kor.	308
Herniaria L.	566
<i>Besseri</i> Fisch.	568
<i>caucasica</i> Rupr.	567
<i>cinerea</i> DC.	571
<i>diandra</i> Bge.	571
<i>glabra</i> L.	567
" var. <i>scabriuscula</i> Fenzl	567
<i>hirsuta</i> L.	571
" var. <i>diandra</i> (Bge.) O. Mur.	571
<i>hirsuta</i> M. B.	568
<i>incana</i> Lam.	568
" var. <i>angustifolia</i> Fenzl	568
" var. <i>latifolia</i> Fenzl	568
<i>odorata</i> Andr.	571
<i>polygama</i> J. Gay	571
Heterochroa Bge.	738
(Bge.) Schischk., sect.	738
<i>desertorum</i> Bge.	740
<i>glandulosa</i> Boiss.	798
<i>microphylla</i> Schrenk	740
<i>petraea</i> Bge.	739
Heterosperma Iljin, sect.	190
Heterotricha Iljin, sect.	236
Holopetalae Schischk., sect.	676
Holosteum L.	466
<i>dichotomum</i> C. Koch	436
<i>glutinosum</i> (M. B.) Fisch. et Mey.	467
<i>imberbe</i> subsp. <i>macropetalum</i> J. Gay	468
<i>liniflorum</i> Fisch. et Mey.	468
" Stev.	468
<i>marginatum</i> C. A. M.	468
<i>polygamum</i> C. Koch	436, 468
<i>umbellatum</i> L.	467
" var. <i>glabrum</i> Schur.	467
" β . <i>glandulosum</i> Vis.	468

	Pag.
Holosteum umb. <i>a. oligandrum</i> Fenzl . . .	467
" <i>β. pleiandrum</i> Fenzl . . .	468
Honkenya Ehrh.	516
<i>peploides</i> Ehrh.	517
Horaninowia Fisch. et Mey.	272
<i>anomala</i> (C. A. M.) Meq.	272
<i>excellens</i> Iljin	274
<i>juniperina</i> Bge.	274
" C. A. M.	272
<i>minor</i> Fisch. et Mey.	273
<i>ulicina</i> Fisch. et Mey.	274
Illecebraceae Hook. f.	549
Illecebrum <i>capitatum</i> M. B.	565
<i>cephalotes</i> M. B.	555, 566
Iljinia Eug. Kor.	309
<i>Regelii</i> (Bge.) Eug. Kor.	309
Inflatae Boiss., sect.	595
Insignis Fenzl, sect.	418
Jalapa Adans.	370
Kali Adans.	211
(Adans.) Ulbrich, sect.	211
<i>Tragus</i> Scop.	213
Kalidium Moq.	166
<i>arabicum a. imbricatum</i> Fenzl	167
" <i>remotiflorum</i> Fenzl	168
<i>caspicum</i> (L.) Ung.-Sternb.	167
<i>foliatum</i> (Pail.) Moq.	166
" <i>f. brevifolium</i> Fenzl	167
" <i>f. glomeratum</i> Fenzl	166
" <i>f. longifolium</i> Fenzl	166
<i>Schrenkianum</i> Bge.	168
Kirilowia Bge.	123
<i>eriantha</i> Bge.	123
<i>pilosa</i> Bge.	120
Kochia Roth	127
<i>arenaria</i> Roth	130
<i>dasyantha</i> Schrad.	131
<i>dasyphylla</i> Fisch. et Mey.	126
<i>densiflora</i> Turcz.	134
<i>diffusa</i> Hort.	125
<i>divaricata</i> Bge.	127
<i>hirsuta</i> Nolte	127
<i>hyssopifolia</i> Roth	125
" <i>var. caspia</i> Schrad.	126
<i>iranica</i> (Hausskn. et Bornm.) Litw. . .	131
" subsp. <i>pamirica</i> Iljin	132
<i>Krylovii</i> Litw.	132
<i>laniflora</i> (S. G. Gmel.) Borb.	130
<i>lanuginosa</i> Bge.	130

	Pag.
<i>latifolia</i> auct.	124
" <i>var. inermis</i> Boiss.	124
<i>melanoptera</i> Bge.	133
<i>mollis</i> Fisch. et Mey.	127
<i>Noëana</i> Boiss.	120
<i>odontoptera</i> Schrenk <i>var. γ.</i>	131
" <i>γ. curta</i> Moq.	131
" <i>β. Schrenkiana</i> Moq.	132
<i>prostrata</i> (L.) Schrad.	128
" <i>var. canescens</i> Moq.	130
" <i>var. villosissima</i> Bong. et Mey. .	130
" <i>virescens</i> Fenzl	130
<i>Schrenkiana</i> (Moq.) Iljin	132
<i>scoparia</i> (L.) Schrad.	133
<i>scoparia var. densiflora</i> Moq.	134
" " <i>Sieversiana</i> Graebn.	134
" " <i>songarica</i> Moq.	134
" <i>β subvillosa</i> Moq.	134
" <i>f. trichophylla</i> Schinz et Thell. .	134
<i>sedoides</i> Schrad.	126
<i>Sieversiana</i> (Pall.) C. A. M.	134
<i>stellaris</i> auct.	132
<i>suffruticulosa</i> Lessing	129
<i>tenuiflora</i> M. B.	131
<i>tianschanica</i> Pavl.	130
<i>trichophila</i> Hort.	134
<i>trigyna</i> Link	180
Kohlrauschia Kunth	779
<i>prolifera</i> (L.) Kunth	779
Krascheninnikowia Turcz.	423
<i>Borodini</i> Kryl.	426
<i>ceratoides</i> Güldenst.	103
<i>Davidi</i> Franch.	426
" <i>var. flogellaris</i> Franch.	426
<i>japonica</i> Korsh.	425
<i>Maximow cziana</i> Franch. et Sav. . . .	429
<i>rigida</i> Kom.	425
<i>rupestris</i> Turcz.	426
<i>silvatica</i> Maxim.	424
Lanceolatae Fenzl, sect.	494
Larbreae Fenzl, subsect.	402
Larbrea St. Hil.	394
<i>palustris</i> Fuss	406
<i>uliginosa</i> Rchb.	410
Lasiocalycinae Boiss.	610
Lasiostemones Boiss., sect.	631
Lecanocarpus aristatus Zucc.	47
Lejopetali Boiss., sect.	839
Lejosperma Iljin, subsect.	179
Lepigonum Wahlb.	556
<i>marginatum</i> Koch	557

	Pag.		Pag.
<i>Lepigonum marinum</i> Wahlb.	557	<i>orientalis</i> Scop.	869
<i>medium</i> Wahlb.	561	<i>parviflora</i> Turcz.	716
<i>rubrum</i> Wahlb.	558	<i>pauciflora</i> Ldb.	716
<i>salsugineum</i> Fisch. et Mey.	557	<i>samojedorum</i> (Sambuk) Gorschk.	694
<i>segetale</i> Koch	562	<i>saxatilis</i> Turcz.	723
Lepyrodiclis Fenzl	480	<i>segetum</i> Lam.	575
<i>cerastioides</i> Kar. et Kir.	481	<i>sibirica</i> L.	693
<i>holosteoides</i> (C. A. M.) Fisch. et Mey.	480	<i>sibirica samojedorum</i> Sambuk	694
<i>stellarioides</i> Schrenk	481	" <i>subsp. jakutensis</i> Sambuk	694
<i>Lerchea altissima</i> Medik.	180	" <i>ssp. villosula</i> A. Tolm.	694
<i>Leucostemma</i> Benth.	421	<i>silvestris</i> Sehkuhr	724
(Benth.) Hook., sect.	421	<i>sordida</i> Kar. et Kir.	715
<i>Limnia propria</i> A. Gray, sect.	383	<i>tristis</i> Bge.	715
<i>Lipandra atriplicoides</i> Moq.	54	<i>uniflora</i> Ldb.	716
<i>Liponeurum</i> Nyman, sect.	577	<i>vespertina</i> Sibth.	725
<i>Loefflingia caspica</i> S. G. Gmel.	564	<i>villosula</i> (Trautv.) Gorschk.	694
Londesia Fisch. et Mey.	124	<i>viscaria</i> L.	576
<i>eriantha</i> Fisch. et Mey.	124	<i>viscosa</i> Scop.	576, 710
<i>Louichea</i> L'Herit.	572	<i>Wilfordi</i> (Rgl.) Maxim.	695
<i>Pteranthus</i> L'Herit.	572		
<i>Lychnideae</i> A. Br., trib.	573	Macrorrhizaea Boiss., subgenus	774
Lychnis L.	692	<i>Macrostegia</i> Boiss., sect.	795
<i>afinis</i> J. Vahl	719	Malachium Fries	430
<i>ajanensis</i> Rgl.	693	<i>aquaticum</i> Fries	430
" <i>var. villosula</i> Trautv.	694	<i>Melandrum</i> Blytt	701
<i>alba</i> Mill.	725	<i>Melandryum</i> Rehb.	701
<i>alpina</i> L.	577	Melandrium Roehl	701
<i>apetala</i> L.	716	<i>adenophoram</i> Schischk.	705
<i>arvensis</i> Sehkuhr	725	<i>affine</i> Kryl.	720
<i>Behen (repens)</i> Hornem.	597	<i>affine</i> J. Vahl	719
<i>brachypetala</i> Hornem.	722	<i>affine angustiflorum</i> A. Tolm.	720
" <i>var. baicalensis</i> Sukatsch.	722	" <i>var. caespitosum</i> A. Tolm.	720
<i>chalconica</i> L.	696	" <i>var. macranthum</i> A. Tolm.	720
<i>cognata</i> Maxim.	695	" <i>tenellum</i> A. Tolm.	721
<i>coriacea</i> Moench	699	<i>ajanense</i> Rohrb.	693
<i>coronaria</i> Desr.	699	<i>Akinievi</i> (Schmalh.) Schischk.	709
<i>dioica</i> L.	724	<i>album</i> (Mill.) Gareke	725
" <i>β. et γ. L.</i>	725	" <i>var. astrachanicum</i> Schischk.	726
" <i>β. rubra</i> Weigel	724	<i>angustiflorum</i> (Rupr.) Walp.	720
<i>diurna</i> Sibth.	724	" <i>var. intermedium</i> A. Tolm.	720
<i>Flos cuculi</i> L.	700	<i>apetalum</i> (L.) Fenzl	716
" <i>f. albiflora</i>	700	<i>apricum</i> (Turcz.) Rohrb.	713
<i>fulgens</i> Fisch.	696	" <i>var. firmum</i> Rohrb.	713
" <i>var. cognata</i> Rgl.	695	<i>astrachanicum</i> Pacz.	726
" " <i>typica</i> Rgl.	696	<i>baicalense</i> (Suk.) A. Tolm.	722
" " <i>Wilfordi</i> Rgl.	695	<i>Balansae</i> Boiss.	724
<i>Githago</i> Scop.	575	<i>Boissieri</i> Schischk.	725
<i>lacinata</i> Lam.	700	<i>brachypetalum</i> Fenzl	721
" <i>var. manshurica</i> Maxim.	695	<i>brachypetalum</i> (Horn.) Fenzl.	722
<i>lusitanica</i> Mill.	700	<i>caspium</i> Grun.	724
<i>macrocarpa</i> Cosson	725	<i>dioicum</i> Coss. et Germ.	725
<i>officinalis</i> Scop.	563	<i>dioicum</i> Simonkai	724

	Pag.
Melandrium diurnum Fries	724
<i>divaricatum</i> Fenzl	725
<i>Elisanthe</i> A. Br., sect.	704
<i>erubescens</i> Schischk.	706
<i>Fedtschenkoanum</i> (Preobr.) Schischk.	705
<i>ferganicum</i> (Preobr.) Schischk.	706
<i>firmum</i> (Sieb. et Zucc.) Rohrb.	713
<i>gracile</i> A. Tolm.	721
" var. <i>Korotkyi</i> A. Tolm.	721
<i>involutratum</i> β . <i>affine</i> Rohrb.	719
" α . <i>angustifolium</i> Rohrb.	720
<i>lacerum</i> Vill.	602
<i>longicarpophorum</i> Kom.	714
<i>macrocarpum</i> St. Supery	725
<i>noctiflorum</i> (L.) Fries	712
<i>Olgae</i> Maxim.	712
<i>ovalifolium</i> Rgl. et Schmalh.	704
<i>pratense</i> Roehl	725
" β . <i>capsula elongata</i> Boiss.	725
<i>purpureum</i> Rupr.	724
<i>quadrilobum</i> (Turcz.) Schischk.	711
<i>ruinarum</i> M. Pop.	709
<i>sachalinense</i> (F. Schmidt) Schischk.	710
<i>saxatile</i> (Turcz.) A. Br.	723
<i>sibiricum</i> A. Br.	693
<i>silvestre</i> (Schkuhr) Roehl	724
<i>Soczavianum</i> Schischk.	715
<i>songaricum</i> Fisch. et Mey.	722
<i>sordidum</i> (Kar. et Kir.) Rohrb.	715
<i>suaveolens</i> (Kar. et Kir.) Schischk.	711
<i>taimyrense</i> A. Tolm.	721
<i>tenellum</i> A. Tolm.	721
<i>triflorum</i> β . <i>ajanense</i> Bgl.	693
<i>triste</i> (Bge.) Fenzl	715
<i>vespertinum</i> Fries	725
<i>viscosum</i> (L.) Čelak.	710
<i>viscosum</i> f. <i>quadrilobum</i> Kryl.	711
" f. <i>suaveolens</i> Schischk.	711
Merckia Fisch.	545
<i>physodes</i> (DC.) Fisch.	545
Micro-Claytonia Kuzen., sect.	383
Microlepis salsa Eichw.	288
Micropeplis Bge.	352
<i>Micropeplis</i> Bge., sect.	352
<i>arachnoidea</i> Bge.	352
Micropetalon Pers.	394
Minuartia L.	482
<i>abchasica</i> Schischk.	495
<i>adenotricha</i> Schischk.	495
<i>aizodes</i> (Boiss.) Bornm.	509
<i>Akinfiwii</i> (Schmalh.) Woron.	490
<i>arctica</i> (Stev.) Asch. et Gr.	515

	Pag.
<i>Aucheriana</i> var. <i>glandulosa</i> Litw.	504
<i>Biebersteinii</i> (Rupr.) Schischk.	500
" var. <i>lineata</i> Schischk.	503
<i>biflora</i> (L.) Schinz et Thell.	516
<i>Brotherana</i> (Trautv.) Woron.	515
<i>Buschiana</i> Schischk.	493
<i>campestris</i> DC.	490
<i>capillacea</i> (All.) Graebn.	510
<i>caucasica</i> (Ad.) Mattf.	509
<i>ciliata</i> Woron.	509
<i>condensata</i> Woron.	499
<i>dianthifolia</i> (Boiss.) Hand.-Mazz.	499
<i>elegans</i> (Cham. et Schlecht.) Schischk.	508
<i>flaccida</i> Mattf.	501
" f. <i>Biebersteinii</i> Mattf.	500
<i>glomerata</i> (M. B.) Degen	492
" subsp. <i>euglomerata</i> Mattf.	492
<i>gracilipes</i> Kom.	502
<i>granuliflora</i> (Fenzl) Grossh.	494
<i>hamata</i> Mattf.	481
<i>Helmii</i> (Fisch.) Schischk.	501
<i>hirsuta</i> (M. B.) Hand.-Mazz.	496
" subsp. <i>falcata</i> var. <i>vestita</i> Mattf.	496
" subsp. <i>oreina</i> Mattf.	499
<i>hybrida</i> (Vill.) Schischk.	488
<i>imbricata</i> Mattf.	514
<i>imbricata</i> (M. B.) Woron.	514
<i>intermedia</i> (Boiss.) Hand.-Mazz.	491
<i>jakutica</i> Schischk.	502
<i>juniperina</i> var. <i>taurica</i> Woron.	504
<i>Krascheninnikovii</i> Schischk.	493
<i>Kryloviana</i> Schischk.	501
<i>laricina</i> (L.) Mattf.	513
<i>lineata</i> Mattf.	504
<i>lineata</i> (C. A. M.) Bornm.	503
" var. <i>glandulosa</i> Schischk.	503
<i>Litwinowii</i> Schischk.	504
<i>longisepa</i> 'a Schischk.	500
<i>macrocarpa</i> (Pursh) Ostenf.	513
" var. <i>minutiflora</i> Hulten	513
<i>Michauxii</i> (Fenzl) Mattf.	502
<i>micrantha</i> Schischk.	494
<i>Méryeri</i> (Boiss.) Bornm.	489
<i>montana</i> L.	491
" Woron.	490
<i>oreina</i> (Mattf.) Schischk.	499
" var. <i>glaberrima</i> Medw.	499
<i>orthotrichoides</i> Schischk.	506
<i>peploides</i> Hiern.	517
<i>pinifolia</i> Hand.-Mazz.	509
<i>pusilla</i> Schischk.	508
<i>Regeliana</i> (Trautv.) Mattf.	488

	Pag.		Pag.
Minnuartia <i>rhodocalyx</i> (Alb.) Woron.	514	<i>asiatica</i> Fisch. et Mey.	73
<i>Rossii</i> Mattf.	508	<i>Litwinowii</i> Pauls.	74
<i>rubella</i> (Walb.) Graebn.	506	Monopterygium <i>minutiflorum</i> Bge.	215
<i>sclerantha</i> (Fisch. et Mey.) Thell.	491	Montia Mich.	384
<i>setacea</i> Schischk.	493	<i>fontana</i> var. <i>chondrosperma</i> Fenzl	394
<i>setacea</i> (Thuill.) Hayek	492	" var. <i>lamprosperma</i> Fenzl	385
" <i>a. trachysperma</i> Fenzl	493	<i>lamprosperma</i> Cham.	385
<i>stricta</i> (Sw.) Hiern	507	<i>minor</i> Gmel.	384
<i>subuniflora</i> Woron.	500	<i>rivularis</i> Gmel.	385
<i>taurica</i> (Stev.) Asch. et Gr.	503	Myosoton Mönch	430
<i>tenuifolia</i> subsp. <i>eutenifolia</i> var. <i>hybrida</i> Briq.	488	<i>aquaticum</i> Mönch	430
<i>tenuifolia</i> subsp. 2 <i>hybrida</i> Mattf.	488	Nanosilene Otth, sect.	628
" subsp. <i>viscosa</i> Briq.	488	Nanophyton Less.	314
<i>turcomanica</i> Schischk.	487	<i>acutum</i> (Falk) Druce	315
<i>verna</i> (L.) Hiern.	505	<i>caspicum</i> Less.	315
<i>Villarsii</i> Grossh.	500	<i>erineaceum</i> (Pall.) Bge.	314
<i>viscosa</i> (Schreb.) Schinz et Thell.	487	<i>juniperinum</i> C. A. M.	315
<i>Wesneri</i> (Stapf) Schischk.	490	<i>macranthum</i> Fisch. et Mey.	315
<i>Woronowii</i> Schischk.	495	Nitraria Ulbrich, sect. p. p. 224, 248, 256, 258, 265	265
Mirabilis L.	370	Noaea Moq.	266
<i>coccinea</i> (Torr.) Benth. et Hook.	371	<i>Aucheri</i> Moq.	261
<i>dichotoma</i> L.	371	<i>cana</i> Fom.	260
<i>jalapa</i> L.	371	<i>daghistanica</i> Turcz.	264
<i>longiflora</i> L.	370	<i>leptoclados</i> (Woron.) Iljin	269
<i>multiflora</i> Torr.	370	<i>minuta</i> Boiss. et Bal.	269
<i>nyctaginea</i> (Mich.) Mac-Millan	371	<i>mucronata</i> (Forsk.) Asch. et Schweinf.	266
<i>viscosa</i> Cav.	371	<i>oppositiflora</i> Moq.	278
Moenchia Ehrh.	388	<i>Regelii</i> Bge.	271
<i>mantica</i> (L.) Bert.	388	<i>spinosissima</i> Moq.	266
Moehringia L.	540	<i>Tournefortii</i> (Spach) Moq.	269
<i>elongata</i> Schischk.	541	" var. <i>leptoclados</i> Woron.	269
<i>lateriflora</i> (L.) Fenzl	541	Nyctagynaceae Lindl.	370
" <i>δ. angustifolia</i> Rgl.	541		
" subsp. <i>genuina</i> Bulavk.	541		
" " <i>glabrescens</i> Bulavk.	541		
" <i>γ. glabrescens</i> Rgl.	541		
" <i>ε. gracilis</i> Rgl.	541		
" <i>β. intermedia</i> Rgl.	541		
" <i>α. typica</i> Rgl.	541		
" var. <i>umbrosa</i> Rgl.	542		
<i>trinervia</i> (L.) Clairv.	540	Obione C. A. M., sect.	102
<i>umbrosa</i> (Bge.) Fenzl	542	<i>fera</i> Moq.	107
Mollugo L.	376	<i>flabellum</i> Bge.	105
<i>cerviana</i> (L.) Ser.	374	<i>lenticulare</i> Moq.	107
<i>tetraphylla</i> L.	564	<i>muricata</i> Gaertn.	102
Monanthos Eug. Kor., sect.	287, 291	<i>peduncalata</i> Moq.	106
Monocarpus Adans.	48	<i>portulacoides</i> Fenzl	104
<i>foliosus</i> Moench	48	<i>sibirica</i> Fisch.	102
Monogone Maxim., sect.	536	<i>thunbergiaefolia</i> Boiss. et Née	103
Monogone (Maxim.) Schischk., subgenus	536	<i>turcomanica</i> Bge.	105
Monolepis Schrad.	73	<i>verrucifera</i> Moq.	104
		Odontopetalae Schischk., sect.	602
		Ofaiston Rafin.	276
		<i>monandrum</i> (Pall.) Moq.	279
		<i>pauciflorum</i> Rafin.	276
		Oligandra Iljin, sect.	317
		<i>atriplicoides</i> Less.	54

	Pag.
<i>Oligandrae sparsiflorae</i> Bge.	317
<i>Oligosperma</i> Baiss., sect.	422
<i>Schischk.</i> sect.	783
<i>Orthadon</i> Ser., sect.	448
<i>Orthodon</i> Fenzl, subgenus	448
<i>Orthosporum glaucum</i> Peterm.	52
<i>Otiteae</i> Boiss., sect.	685
<i>Otites</i> Adans.	685
<i>Otitis</i> (Adans.) <i>Schischk.</i> subgenus	685
<i>Otites</i> Otth, sect.	685
<i>Oxybaphus nyctogineus</i> Sweet.	371
<i>Oxybasis minutiflora</i> Kar. et Kir.	51
Panderia Fisch. et Mey.	119
<i>divaricata</i> C. Koch	120
<i>monticola</i> Boiss.	120
<i>pilosa</i> auct.	120
<i>pilosa</i> Fisch. et Mey.	120
<i>turkestanica</i> Iljin	120
<i>Paniculata</i> Golenk., sect.	800
Paronychia Adans.	565
<i>argentea</i> Lam.	565
<i>capitata</i> Ldb.	565
" (L.) Lam.	565
" <i>pubescens</i> Fenzl	566
<i>cephalotes</i> (M. B.) Bess.	565
<i>kurdica</i> Boiss.	566
<i>nivea</i> C. A. M.	566
<i>splendens</i> Stev.	566
<i>striata</i> DC.	564
<i>Paronychyeae</i> A. St. Hil.	549
<i>Paronychyeae</i> — <i>Scleranthaeae</i> Juss.	546
<i>Paronychieae</i> — <i>Sperguleae</i> Bartl.	549
<i>Paronychiella</i> Williams, sect.	571
<i>Paronychioidae</i> Luders	564
<i>Paronychioideae</i> Vierh., subfam.	549
<i>Pentandrae oppositifoliae</i> Bge.	325
<i>Pentandrae sparsifollae</i> Bge.	319
<i>Perennia</i> Fenzl, subsect.	453
<i>Periandra caespitosa</i> Camb.	546
Petrocoma Rupr.	726
<i>Hoefftiana</i> (Fisch.) Rupr.	729
<i>Petrorhagia glomerata</i> Link	746
Petrosimonia Bge.	316
<i>brachiata</i> (Pall.) Bge.	325
<i>brachyphylla</i> (Bge.) Iljin	323
<i>crassifolia</i> (Pall.) Bge.	319
" var. <i>brachyphylla</i> Bge.	323
" var. <i>glaucescens</i> Bge.	323
" <i>gracilis</i> Bge.	323
" <i>hirsutissima</i> Bge.	323
<i>diandra</i> Litw.	319
<i>glauc</i> auct.	323

	Pag.
<i>glauc</i> (Pall.) Bge.	324
<i>glauceseons</i> (Bge.) Iljin	323
<i>hirsutissima</i> (Bge.) Iljin	323
<i>Korshinskji</i> Litw.	235
<i>Litwinowi</i> Korsh.	319
" f. <i>stricta</i> Litw.	319
<i>monandra</i> (Pall.) Bge.	317
<i>oppositifolia</i> Litw.	319
<i>Pallasii</i> Iljin	324
<i>sibirica</i> (Pall.) Bge.	326
" f. <i>Bungeana</i> Serg.	326
" <i>glaberrima</i> Korsh.	326
<i>squarrosa</i> (Schrenk) Bge.	325
<i>triandra</i> (Pall.) Simonk.	318
<i>Volvox</i> Bge.	318
<i>Pharnaceum Cerviana</i> L.	374
<i>Physocarpus</i> Neck.	701
<i>Pterocarpus</i> Beck., sect.	128
<i>Physolynhis gonosperma</i> Rupr.	716
<i>Physophora</i> Iljin, sect.	190
<i>Physurus</i> Iljin, sect.	224
Phytolacca L.	373
<i>americana</i> L.	373
<i>decandra</i> L.	373
<i>Phytolaccaceae</i> Lindl.	372
Piptoptera Bge.	339
<i>turkestanica</i> Bge.	340
<i>Pleiosperma</i> Boiss., sect.	793
<i>Plumaria</i> (Opiz) Asch. et Graebn., sect.	848
<i>Plumaria</i> Opiz	848
<i>Polyanthos</i> Eug. Kor., sect.	284, 285
<i>Polycarpeae</i> DC., trib.	563
Polycarpus Loebl.	564
<i>diphyllum</i> Cav.	564
<i>tetraphyllum</i> L.	564
<i>triphyllum</i> var. <i>diphyllum</i> (Cav.) DC.	564
<i>Polcnemeae</i> Dumort.	29
Polycnemum L.	29
<i>alternifolium</i> Pall.	319
<i>arvense</i> L.	29
" <i>β. filifolium</i> Neilr.	30
" <i>β. Heuffelii</i> Fiek	30
" var. <i>longifolium</i> Neilr.	31
" <i>α. macrophyllum</i> Neilr.	31
" <i>β. majus</i> Döll.	31
" <i>β. minus</i> Döll.	29
" var. <i>simplex</i> Wallr.	31
" var. <i>verrucosum</i> Oborny	30
<i>brachiatum</i> Pall.	325
<i>conjugatum</i> M. B.	325
<i>crassifolium</i> Pall.	319
<i>erinaceum</i> Pall.	315

	Pag.
Polycnemum Fontanesii Dur. et Moq.	32
<i>glaucum</i> Pall.	323, 324
<i>Heuffelii</i> Lang.	30
<i>juniperinum</i> M. B.	315
<i>majus</i> A. Br.	31
<i>malacophyllum</i> M. B.	348
<i>monandrum</i> Pall.	317
<i>nuciferum</i> Pall.	332
<i>paradoxum</i> Schur	30
<i>perenne</i> Litw.	31
<i>oppositifolium</i> Pall.	319
<i>salsum</i> Willd.	318
<i>sclerospermum</i> Pall.	332
<i>sibiricum</i> Pall.	326
<i>triandrum</i> Pall.	318
<i>verrucosum</i> Lang	30
<i>viaticum</i> Pall.	29, 31
<i>volvox</i> Pall.	318
<i>vulgare</i> Pall.	29
Polymechana Mattf., sect.	504
Portulaca L.	386
<i>oleracea</i> L.	386
Portulacaceae Lindl.	376
Proliferastrum Williams, subgenus	860
Proteinia Rchb.	861
<i>orientalis</i> (L.) Ser.	869
Pseudoacanthophyllum Boiss., sect.	772
Pseudalsine Boiss., sect.	423
Pseudoblitum Aellen, sect.	52
Pseudonoaea Ulbrich	251
" sect.	245, 258
Pseudosaponaria Willd., subgenus	776
Pseudostellaria Pax	423
<i>Borodini</i> Pax	429
<i>japonica</i> Pax	425
<i>Maximowicziana</i> Pax	429
<i>rigida</i> Pax	425
<i>rupestris</i> Pax	429
<i>silvatica</i> Pax	424
Pterantheae Endl., trib.	572
Pteranthus Forsk.	572
<i>dichotomus</i> Forsk.	572
<i>echlnatus</i> Desf.	572
Pterocalyx strictissimus Schrenk	198
Pterochlamys pilosa Fisch. et Mey.	120
Pulvinares Boiss., sect.	744
Querezia L.	481
<i>hispanica</i> L.	481
Queria L.	481
Queria Loeffl.	481
<i>hispanica</i> L.	481

	Pag.
Rhaphidophyton Iljin	271
<i>Regelii</i> (Bge.) Iljin	271
Rhizomatosae A. Gray, sect.	382
Rigidulae Boiss., sect.	681
Rokejeka Forsk.	738
Rokejeka (Forsk.) Graebn., subgenus	738
Sabulina Rchb.	487
(Rchb.) Asch. et Gr., sect.	487
<i>biflora</i> Rchb.	516
<i>procera</i> Rchb.	525
<i>stricta</i> Rchb.	507
<i>viscosa</i> Rchb.	488
Sagina Druce	482
Sagina L.	471
<i>apetala</i> Arduino	474
<i>arctica</i> Scheutz	473
<i>intermedia</i> Fenzl	475
<i>Linnaei</i> Presl	472
" var. <i>maxima</i> Maxim.	473
<i>littoralis</i> Hultén	473
<i>maxima</i> A. Gray	473
<i>nivalis</i> (Lindbl.) Fries	475
<i>nodosa</i> (L.) Fenzl	472
" var. <i>glandulosa</i> Bess.	472
<i>oxysepala</i> Boiss.	475
<i>procumbens</i> L.	474
<i>saginoides</i> (L.) Dalla Torre	472
" var. <i>decandra</i> Fenzl	473
" " <i>micrantha</i> (Bge.) Fenzl	473
<i>sinensis</i> Hance	473
Saginella Koch, sect.	474
Salicornia L.	172
<i>acetaria</i> Pall.	172
<i>arabica</i> Pall.	167
<i>caspia</i> L.	167
<i>caspica</i> Pall.	169
<i>europaea herbacea</i> L.	172
<i>foliata</i> Pall.	166
<i>herbacea</i> L.	172
" <i>a. acetaria</i> Moq.	172
" <i>a. leptostachya</i> Fenzl	172
" <i>γ. pygmaea</i> Moq.	169
" var. <i>pachystachya</i> Koch	172
" <i>f. prostrata</i> (Pall.) Moq.	172
" <i>f. stricta</i> (Willd.) G. F. W. Meyer	172
Pallasii C. A. M.	167
perennans Willd.	172
prostrata Pall.	172
pygmaea Pall.	169
stricta Willd.	172

	Pag.
<i>Salicornia strobilacea</i> Pall.	171
Salicornieae Dum., trib.	165
Salsina Moq., sect.	177, 182
Salsola L.	200
<i>Abolini</i> Eug. Kor.	240
<i>affinis</i> C. A. M.	235
<i>altaica</i> (C. A. M.) Iljin	212
<i>altissima</i> Dryander	178
<i>altissima</i> L.	180
<i>Androssovii</i> Litw.	223
<i>anomala</i> C. A. M.	272
<i>aperta</i> Iljin	213
<i>aperta</i> Pauls.	222
" var. <i>stricta</i> Iljin	222
<i>arborescens</i> L. f.	237
" <i>a. rugosiuscula</i> Moq.	238, 243
" <i>β. glabrescens</i> Moq.	242
" var. <i>Richteri</i> Moq.	242
<i>arbuscula</i> Pall.	237
" var. <i>angustifolia</i> Fenzl	242
<i>arbuscula</i> a. C. A. M.	243
" γ. C. A. M.	242
" <i>a. exasperata</i> Fenzl	243
" <i>birta</i> Litw.	238
" <i>laeviuscula</i> Fenzl	238
" <i>typica</i> Litw.	238
<i>arbusculaeformis</i> Drob.	239
" f. <i>glabra</i> Iljin	239
" f. <i>hirta</i> Iljin	239
<i>arenaria</i> Iljin	246
<i>arenaria</i> Maerkl.	131
<i>asparagoides</i> Miq.	178
<i>Aucheri</i> Bge.	261
<i>aurantiaca</i> auct.	261
<i>auricula</i> Moq.	270
<i>baccata</i> Pall.	265
<i>baccifera</i> Pall.	265
<i>Baranovii</i> Iljin	244
<i>brachiata</i> Pall.	236
" var. <i>aequipila</i> Iljin	236
" <i>glabra</i> Iljin	236
" <i>hirsutissima</i> Iljin	236
<i>bracteata</i> Georgi	236
<i>bucharica</i> Iljin	225
<i>caesia</i> Fisch. et Mey.	256
<i>cana</i> C. Koch	260
<i>carinata</i> C. A. M.	257
" f. <i>turkestanica</i> (Litw.) Iljin	258
<i>chiwensis</i> M. Pop.	241
<i>clavifolia</i> Hohen.	184
" Pall.	265
<i>collina</i> Pall.	215

	Pag.
<i>collina</i> f. <i>elata</i> Turcz.	215
" f. <i>glabra</i> C. A. M.	215
" f. <i>humilis</i> Turcz.	215
" f. <i>subhirta</i> C. A. M.	215
<i>crassa</i> M. B.	226
" f. <i>lanifera</i> Iljin	226
" <i>α. pubescenti-lanuginosa</i> C. A. M.	234
" <i>α. tomentosa</i> Fenzl	234
<i>daghestanica</i> (Turcz.) Lipsky	264
<i>dasyantha</i> Pall.	131
<i>dendroides</i> Pall.	255
<i>deserticola</i> Iljin	223
<i>dichotoma</i> Pall.	276
<i>dschungarica</i> Iljin	252
<i>elegantissima</i> Iljin	216
<i>ericaeifolia</i> Adams	255
<i>ericoides</i> C. A. M.	255
<i>ericoides</i> M. B.	256
<i>ericoides</i> Moq.	254
" var. <i>bracteolosa</i> Fenzl	254
<i>erubescens</i> Schrad.	215
<i>exasperata</i> a. C. A. M.	243
" γ. C. A. M.	242
<i>excellens</i> Iljin	274
<i>ferganica</i> Drob.	234
<i>florida</i> Poir.	276
<i>foetida</i> Pauls.	255
<i>foliosa</i> (L.) Schrad.	265
<i>forcipitata</i> Iljin	263
<i>frutescens</i> Pall.	226
<i>fruticosa</i> M. B.	181
<i>fruticosa</i> Pall.	226
<i>gemmascens</i> Fenzl	258
<i>gemmascens</i> Pall.	259
<i>georgica</i> Bge.	255
<i>glauc</i> C. A. M.	256
<i>glauc</i> M. B.	246
" var. <i>hispidula</i> Litw.	247
<i>glomerata</i> Steph.	351
<i>Gmelini</i> Rouy	212
<i>gossypina</i> Bge.	263
<i>heptapotamica</i> Iljin	233
<i>hirsuta</i> L.	127
<i>hispidula</i> Bge.	247
<i>hyssopifolia</i> Pall.	125
<i>iliensis</i> Lipsky	248
<i>incanescens</i> C. A. M.	254
<i>iranica</i> Hausskn. et Bornm.	131
<i>ircutiana</i> Gandoger	212
<i>Kali</i> auct.	212
<i>Kali</i> L.	214
" <i>α. baltica</i> Zapalow.	214

	Pag.		Pag.
Salsola Kali <i>a. crassifolia</i> lus 2 Fenzl	213	<i>Pallasiana</i> Vest.	236
„ <i>β. angustifolia</i> Fenzl	212	<i>paradoxa</i> Bge.	221
„ <i>β. Trogus</i> Moq.	213	<i>passerina</i> Bge.	260
„ <i>γ. nodiflora</i> Fenzl	216	Paulseni Litw.	216
„ <i>λ. pseudotrogus</i> Beck	221	„ f. <i>glabra</i> Iljin	217
„ var. <i>β.</i> Pall.	216	<i>pellucida</i> Litw.	217
„ var. <i>altaica</i> C. A. M.	212	<i>pestifer</i> A. Nelson	212
„ var. <i>angustifolia</i> auct.	215	<i>physophora</i> Schrad.	190
„ var. <i>crassifolia</i> Fenzl	214	<i>pilosa</i> Pall.	348
„ var. <i>glabra</i> Forsk.	213	<i>planistigma</i> Drob.	247
„ var. <i>hirsuta</i> Hornem.	214	<i>pontica</i> (Pall.) Iljin	212
„ var. <i>polysarca</i> G. F. Mey.	214	<i>praecox</i> Litw.	216
„ var. <i>pontica</i> Pall.	212	„ f. <i>elegantissima</i> Iljin	216
„ var. <i>praecox</i> Litw.	216	„ f. <i>glabra</i> Iljin	216
„ var. <i>rosacea</i> Pall.	212	„ f. <i>hirtula</i> Iljin	216
„ var. <i>splendens</i> Litw.	212	<i>prostrata</i> L.	129
„ var. <i>typica</i> Beck.	214	<i>pseudotragus</i> (Beck.) Iljin	212
„ var. <i>virgata</i> Litw.	212	<i>pulla</i> C. Koch	276
„ var. <i>vulgaris</i> Koch	214	<i>Regelii</i> Litw.	309
<i>kasakorum</i> Iljin	225	<i>Richteri</i> Karel.	242
<i>Komarovii</i> Iljin	221	„ var. <i>Androssowi</i> Litw.	242
<i>Korshinskyi</i> Drob.	230	„ var. <i>glabrescens</i> Litw.	242
„ var. <i>villosa</i> Iljin	230	<i>rigida</i> Pall.	251
<i>lachnophylla</i> Iljin	232	„ var. <i>calvescens</i> Fenzl	251
<i>lanata</i> Pall.	224	„ var. <i>vestita</i> Fenzl	251
<i>laniflora</i> S. G. Gmel.	131	<i>rosacea</i> L.	219
<i>laricifolia</i> (Turcz.) Litw.	239	<i>rosacea</i> M. B.	226
<i>laricina</i> Pall.	252	<i>Roshevitzii</i> Iljin	244
„ var. <i>villosa</i> Fenzl	252	<i>ruthenica</i> Iljin	212
<i>leiosperma</i> D. Dietr.	180	<i>sclerantha</i> C. A. M.	257
<i>leptoclada</i> Gandog.	257	„ var. <i>carinata</i> Minkw.	257
<i>longistylota</i> Iljin	225	<i>scoparia</i> M. B.	133
<i>macera</i> Litw.	254	<i>sedoides</i> Pall.	126
<i>maracandica</i> Iljin	240	<i>septentrionalis</i> Iljin	233
<i>Meyeri</i> Litw.	219	<i>soda</i> L.	220
<i>microkali</i> M. Pop.	213	<i>soda</i> F. Schmidt	221
<i>Minkvitziae</i> Eug. Kor.	232	„ var. <i>mutica</i> Trautv.	220
<i>monandra</i> Pall.	276	„ var. <i>typica</i> Trautv.	220
<i>monoptera</i> Bge.	215	<i>sogdiana</i> Bge.	221
<i>montana</i> Litw.	240	<i>sogdiana</i> Litw.	222
<i>Moquiniana</i> Jaub. et Spach	270	<i>soongorica</i> Sievers	134
<i>mucronata</i> Forsk.	266	<i>spicata</i> Pall.	246
<i>muricata</i> Pall.	126	<i>spinifera</i> Abolin et Eug. Kor.	238
<i>mutica</i> C. A. M.	220	<i>spinifera</i> Pall.	266
<i>nitraria</i> Pall.	253	<i>spissa</i> Boiss.	254
<i>nodulosa</i> (Moq.) Iljin	258	„ M. B.	253
<i>obtusifolia</i> Iljin	233	<i>stellulata</i> Eug. Kor.	262
<i>obtusifolia</i> Litw.	230	<i>subaphylla</i> C. A. M.	245
<i>Olgae</i> Iljin	235	„ var. <i>arenaria</i> Drob.	246
<i>oppositiflora</i> Pall.	278	„ subsp. <i>strangulata</i> Iljin	246
<i>orientalis</i> S. G. Gmel.	251	„ var. <i>typica</i> Drob.	246
<i>Paletziana</i> Litw.	243	<i>suberassa</i> M. Pop.	229

	Pag.
Salsola Takhtadshjanii Iljin	261
<i>talassica</i> Drob.	219
<i>Tamamschjanae</i> Iljin	218
<i>tamaricifolia</i> Falk	218
<i>tamaricina</i> Pall.	218
<i>tenuifolia</i> Falk.	218
<i>tenuifolia</i> M. B.	136
<i>tragus</i> L.	213
<i>transhyrcanica</i> Iljin	243
<i>transoxana</i> Iljin	230
<i>trigyna</i> Willd.	180
<i>turgaica</i> Iljin	232
<i>turgida</i> Dum.	214
<i>turkestanica</i> Litw	258
<i>turcomanica</i> Litw.	234
<i>vermiculata</i> M. B.	252, 255
„ var. <i>laricina</i> Moq.	252
<i>verrucosa</i> M. B.	255
<i>Vvedenskyi</i> Iljin	262
<i>Salsolaria</i> Moq., sect.	265
<i>Salsoleae</i> C. A. M.	200
Saponaria L.	851
<i>alluvionalis</i> Du Molin	863
<i>atocioides</i> Boiss.	867
„ var. <i>Calverti</i> Boiss.	867
<i>Calverti</i> Boiss.	867
<i>cerastioides</i> Fisch.	868
<i>corrugata</i> Franch.	864
<i>dichotoma</i> Kom.	775
<i>diurna</i> Fenzl	724
<i>Elisanthe</i> Fenzl, sect.	704
<i>fastigiata</i> Lam.	747
<i>filipes</i> Boiss.	775
<i>floribunda</i> Boiss.	775
<i>glutinosa</i> M. B.	863
<i>Griffithiana</i> Boiss.	864
<i>holopetala</i> Ldb.	867
<i>muralis</i> Lam.	774
<i>nervosa</i> Gilib.	863
<i>officinalis</i> L.	863
„ var. <i>glabriuscula</i> Schischk.	863
„ <i>puberula</i> Siml.	863
<i>orientalis</i> L.	869
„ var. <i>communis</i> Trautv.	869
„ var. <i>glabrata</i> Trautv.	869
<i>parvula</i> Bge.	867
<i>porrigens</i> L.	776
<i>prostrata</i> Willd.	867
<i>pungens</i> Bge.	784
<i>segetalis</i> Neck.	802
<i>Sewerzowii</i> Rgl. et Schmalh.	867
<i>silenoides</i> H. Winkl.	864

	Pag.
<i>vaccaria</i> L.	802
<i>viscosa</i> C. A. M.	868
<i>vespertina</i> Fenzl	725
<i>Saponarioideae</i> Boiss., sect.	862
<i>Schanginia</i> C. A. M.	177, 182
Moq.	177, 182
(C. A. M.) Iljin, sect.	177
<i>altissima</i> C. A. M.	180
<i>arbuscula</i> Kar. et Kir.	188
<i>baccifera</i> Fenzl	184, 200
<i>Borszczowii</i> Bge.	199
<i>inderiensis</i> Bge.	177
<i>linifolia</i> C. A. M.	177
<i>Kareliniana</i> var. <i>vulgaris</i> Trautv.	188
<i>Schizotheca</i> C. A. M., sect.	86
<i>hastata</i> Fourr.	91
<i>laciniata</i> Fourr.	95
<i>littoralis</i> Fourr.	86
<i>patula</i> Fourr.	88
<i>tatarica</i> Čelak.	95
<i>Schoberia</i> C. A. M.	182, 191
<i>acuminata</i> C. A. M.	187
<i>altissima</i> C. A. M.	180
<i>baccifera</i> C. A. M.	184, 200
<i>corniculata</i> (C. A. M.) Bge.	195
<i>cycloptera</i> Bge.	200
<i>dendroides</i> C. A. M.	181
<i>Dumortieri</i> Steud.	193
<i>glauca</i> Bge.	178
<i>heterophylla</i> Kar. et Kir.	197
<i>lejosperma</i> C. A. M.	180
<i>maritima</i> C. A. M.	194
<i>microsperma</i> C. A. M.	188
<i>microphylla</i> C. A. M.	179
<i>obtusifolia</i> Bge.	191
<i>Pallasiana</i> C. A. M.	127
<i>parviflora</i> Less.	194
<i>physophora</i> C. A. M.	190
<i>pterantha</i> Kar. et Kir.	187
<i>pygmaea</i> Kar. et Kir.	183
<i>salsa</i> auct.	187
„ C. A. M.	187, 191
<i>transoxana</i> Bge.	188
<i>trigyna</i> C. A. M.	180
<i>Scleranthaeae</i> St. Hil.	546
<i>Scleranthaeae</i> Vierh., trib.	546
<i>Scleranthoideae</i> Lüders	546
Scleranthus L.	546
<i>annuus</i> L.	547
<i>annuus</i> β . <i>cymosus</i> Fenzl	547, 548
„ β . <i>polycarpus</i> Čelak.	548
„ var. <i>uncinatus</i> Boutigny	548

	Pag.
Scleranthus annuus verticillatus Fenzl	548
<i>hamatus</i> Hausskn.	481
perennis L.	547
polycarpus L.	548
tauricus Presl.	547
uncinatus Schur.	548
verticillatus Tausch	548
Sclerocalycinae Boiss., sect.	636
Sclerocalymma Asch., sect.	94
Seidlitzia Bge.	275
florida (M. B.) Boiss.	276
rosmarinus (Ehrh.) Bge.	275
Semibassia Beck., sect.	133
Setifera Ulbrich, sect.	284
Silenaceae Lindl.	573
<i>Silenanthe</i> Griseb.	704
<i>Silenastrum</i> Rouy	602
Silene L.	577
<i>acarpophora</i> Griseb.	691
acaulis L.	628
" var. <i>alba</i> Otth	629
" var. <i>excapa</i> (All.) DC.	629
adenopetala H. Raik.	605
<i>Ank fievii</i> Schmalh.	709
Alexandrae Keller	646
alpicola Schischk.	674
altaica Otth.	664
altaica Pers.	646
" <i>β. grandiflora</i> C. A. M.	646
" var. <i>hystrix</i> Trautv.	646
" var. <i>typica</i> Trautv.	646
<i>ambigua</i> Turcz.	627
<i>amoena</i> With.	597
anglica L.	612
<i>angustifolia</i> M. B.	663
" subsp. <i>vulgaris</i> var. <i>com-</i>	
<i>mutata</i> Briq.	597
anisoloba Schrenk	642
apetala Willd.	614
<i>aprica</i> Turcz.	713
araratica Schischk.	672
arenosa C. Koch	682
arguta Grossh.	660
" <i>β. armena</i> Boiss.	660
" <i>β. sisianica</i> Rohrb.	660
armena Boiss.	639
armeniaca Rohrb.	653
armeria L.	615
Armeria Pall.	863
" subsp. <i>β. compacta</i> Schmalh.	615
" <i>compacta</i> Fedtsch. et Fler.	615
artwinensis Schischk.	660

	Pag
<i>asperifolia</i> Freyn	632
Aucheriana Boiss.	657
" <i>β. Hohenackeri</i> Boiss.	657
" <i>lusus</i> 2 Rohrb.	657
<i>baccifera</i> L.	729
balchaschensis Schischk.	618
baldshuanica B. Fedtsch.	643
baschkirorum Janisch.	687
Bobrovii Schischk.	679
Bornmülleri Freyn	658
brachypetala Rob. et Cast.	613
brahuica Boiss.	653
Brotherana Som. et Lev.	653
<i>bryoides</i> Jord.	629
bucharica M. Pop.	643
bupleuroides L.	637
<i>caespitosa</i> Salisb.	629
<i>caespitosa</i> Stev.	655
<i>calyculata</i> C. Koch	640
capitellata Boiss.	681
<i>caspica</i> Pers.	647
<i>catholica</i> Ldb.	674
caucasica (Bge.) Boiss.	668
" <i>β. major</i> Rupr.	654
" var. <i>pamirensis</i> H. Winkl.	670
cephalantha Boiss.	654
chaetodonta Boiss.	681
chamarensis Turcz.	626
" var. <i>paucifolia</i> Kryl.	626
<i>chersonensis</i> Kleop.	686
<i>chlorantha</i> (Willd.) Ehrh.	616
chlorifolia Sm.	640
chloropetala Rupr.	623
claviformis Litw.	651
commelinifolia Boiss.	699
commutata Guss.	597
compacta Fisch.	615
conformifolia Preobr.	604
conica L.	690
coniflora Griseb.	691
conoidea L.	690
<i>coronaria</i> Clairw.	699
cretacea Fisch.	647
crispans Litw.	659
<i>crispata</i> Stev.	598
Cserei Baumg.	598
<i>cucubalus</i> Wibel	596
<i>cucubalus β. commutata</i> Rohrb.	597
<i>cylindrifolia</i> Otth	691
Cyri Schischk.	688
Czerei Boiss.	598
daghestanica Rupr.	620

	Pag.
Silene dasyphylla Turcz.	627
<i>debilis</i> Stapf	681
<i>densiflora</i> D'Urv.	686
<i>depressa</i> auct.	672
„ C. A. M.	671
<i>depressa</i> M. B.	667
<i>depressa</i> var. <i>α</i> . Ldb.	667
„ <i>β</i> . Ldb.	668
„ <i>γ</i> . Ldb.	671
„ <i>β</i> . Meyer Rohrb.	671
„ <i>guntensis</i> B. Fedtsch.	672
<i>dianthoides</i> Pers.	629
„ var. <i>glabrata</i> Trautv.	629
„ var. <i>typica</i> Trautv.	629
<i>dichotoma</i> Ehrh.	610
<i>dichotoma</i> <i>γ</i> . Ldb.	612
„ var. <i>iberica</i> Trautv.	611
<i>dioica</i> Fisch. et Mey.	691
<i>elata</i> Otth.	616
<i>eremitica</i> Boiss.	623
<i>euxina</i> Rupr.	612
<i>excapa</i> All.	629
<i>Fabaria</i> Rehb.	598
<i>Fabaria</i> <i>β</i> . Czerei Rohrb.	598
<i>Fedtschenkoana</i> Preobr.	705
<i>fergana</i> Preobr.	706
<i>filipes</i> Freyn et Sint.	639
<i>fimbriata</i> Sims.	601
<i>firma</i> Sieb. et Zucc.	713
<i>foliosa</i> Maxim.	625
<i>foliosa</i> <i>β</i> . <i>macrostyla</i> Rohrb.	624
„ <i>α</i> . <i>typica</i> Rohrb.	625
<i>fruticulosa</i> M. B.	647
„ Schischk.	646
<i>gallica</i> L.	612
<i>gasimailikensis</i> B. Fedtsch.	636
<i>gaudanensis</i> Litw.	659
<i>Gawrilowii</i> Krassn.	617
<i>Gawrilowii</i> (Krassn.) M. Pop.	617
<i>Gebleriana</i> Schrenk.	676
„ var. <i>purpurea</i> Schischk.	677
<i>glaucescens</i> Schischk.	618
<i>graminifolia</i> Bge.	664
„ Ldb.	626, 627
„ Otth	625
„ <i>β</i> . <i>lychnidea</i> Rgl.	662
„ <i>ε</i> . <i>paucifolia</i> Rgl.	626
„ var. <i>stenophylla</i> Trautv.	627
„ <i>f. turgida</i> Rgl.	664
<i>Grossheimii</i> Schischk.	667
<i>guntensis</i> B. Fedtsch.	672
<i>gypsophila</i> Desf.	684

	Pag.
<i>gypsophiloides</i> Schrank	654
<i>Helmanni</i> Claus	688
<i>heptapotamica</i> Schischk.	651
<i>hissarica</i> M. Pcp.	638
<i>Hofftiana</i> Fisch.	729
<i>Hohenackeri</i> Boiss.	657
<i>holopetala</i> Bge.	677
<i>holopetala</i> var. <i>Gawrilowii</i> Krassn.	617
<i>humilis</i> C. A. M.	662
<i>iberica</i> M. B.	610
<i>ircurvifolia</i> Kar. et Kir.	668
<i>indeprensa</i> Schischk.	659
<i>inflata</i> Sm.	596
„ var. 2 Ldb.	597
„ <i>β</i> . <i>armena</i> C. Koch	597
„ <i>β</i> . <i>athoa</i> Griseb	597
„ forma 1 Ldb.	598
„ <i>δ</i> . <i>maritima</i> Otth	597
„ <i>γ</i> . <i>spatulata</i> Rgl.	598
„ <i>vulgaris</i> Turcz.	596
<i>ispirensis</i> Boiss. et Hult.	657
<i>italica</i> (L.) Pers.	675
<i>italica</i> var. <i>lejocalycina</i> Rupr.	675
<i>jenissea</i> Poir.	627
<i>jenisseensis</i> Willd.	627
„ <i>f. ambigua</i> (Turcz.) Schischk. 628	
„ <i>f. dasyphylla</i> (Turcz.) Schischk. 628	
„ <i>f. latifolia</i> (Turcz.) Schischk. 628	
„ <i>f. parviflora</i> (Turcz.) Schischk. 628	
„ <i>f. puberula</i> Schischk.	628
„ <i>f. purpurea</i> Schischk.	628
„ <i>f. setifolia</i> (Turcz.) Schischk. 628	
„ <i>vulgaris</i> (Turcz.) Schischk.	628
<i>karaczukuri</i> B. Fedtsch.	671
<i>Komarovii</i> Schischk.	678
<i>koreana</i> Kom.	624
<i>Korshinskiyi</i> Schischk.	673
<i>Kowalensky</i> Sotschegl.	682
<i>kubanensis</i> Som. et Lev.	663
<i>Kudrjaschevii</i> Schischk.	644
<i>kulabensis</i> B. Fedtsch.	643
<i>kungessana</i> B. Fedtsch.	679
<i>Kuschakewiczii</i> Rgl. et Schmalh.	670
<i>lacera</i> (Stev.) Sims.	602
<i>lasiantha</i> C. Koch	632
<i>latifolia</i> (Mill.) Rendle	596
<i>lazica</i> Boiss.	609
<i>Ledebourii</i> Heynh.	661
<i>leptocaulis</i> Schischk.	645
<i>leptopetala</i> Schrank	647
<i>leyseroides</i> Boiss.	682

	Pag.
Silene linearifolia Otth.	663
" var. <i>gymnocalycina</i> Rupr.	663
<i>lithophila</i> var. <i>tianschanica</i> Schischk.	619
<i>lithophila</i> Kar. et Kir.	618
<i>lithigiosa</i> Schrenk	669
<i>Litwinowii</i> Schischk.	637
<i>longicalycina</i> Kom.	638
<i>longidens</i> Schischk.	639
<i>longiflora</i> Boiss.	637
<i>bongiflora</i> Ehrh	636
" var. <i>junceae</i> Otth	638
" var. <i>Seidlitzii</i> Som. et Lev.	638
<i>longipetala</i> Boiss.	623
" var. <i>asperifolia</i> Williams	632
<i>lusitanica</i> L.	612
<i>lychnidea</i> C. A. M.	662
" var. <i>glabrifolia</i> Rupr.	662
" var. <i>purpurea</i> Schischk.	662
" var. <i>ulukamensis</i> Schischk.	662
<i>B macrostyla</i> Maxim.	624
<i>Marcowiczii</i> Schischk.	630
<i>maritima</i> With.	597
<i>Marschallii</i> C. A. M.	635
<i>Marschallii</i> var. <i>lasiantha</i> Rupr.	632
<i>media</i> (Litw.) Kleop.	689
<i>melandriiformis</i> Maxim.	713
<i>melanophylla</i> Boiss.	629
<i>Meyeri</i> Fenzl	671
" f. <i>calycina</i> Lipsky	672
<i>Michelsoni</i> Preobr.	605
<i>modesta</i> Boiss. et Bal.	681
<i>Montbretiana</i> Boiss.	657
" var. <i>anisoloba</i> Vill.	642
<i>multifida</i> (Ad.) Rohrb.	601
" var. <i>gl. ndulosa</i> Som. et Lev.	601
" f. <i>lacera</i> Rohrb.	602
<i>multiflora</i> (Ehrh.) Pers.	617
<i>nana</i> Kar. et Kir.	682
<i>nemoralis</i> Alb.	675
<i>Nevskii</i> Schischk.	673
<i>noctiflora</i> L.	712
<i>nocturna</i> var. <i>brachypetala</i> Benth.	613
" f. <i>pauciflora</i> Otth.	613
<i>norvegica</i> Pers.	629
<i>nutans</i> L.	674
" f. <i>glabra</i> Kryn.	675
<i>nutantiformis</i> Simk.	674
<i>obovata</i> Schischk.	680
<i>obtusidentata</i> B. Fedtsch.	644
<i>odontopetala</i> f. <i>a.</i> Kom.	604
" f. <i>β.</i> Kom.	604
" var. <i>ovalifolia</i> M. Pop.	704

	Pag.
<i>odontopetala</i> var. <i>ovalifolia</i> Rgl. et Schmalh.	603
" var. <i>typica</i> Rgl.	604
<i>odoratissima</i> Bge.	641
<i>Olgae</i> Rgl. et Schmalh.	642
" Rohrb.	712
<i>Olghiana</i> B. Fedtsch.	641
<i>olympica</i> γ. <i>calyculata</i> Williams	640
" var. <i>pubescens</i> Boiss.	632
" var. <i>stenophylla</i> Boiss.	640
" var. <i>stenophylla</i> Trautv.	632
<i>oreina</i> Schischk.	603
<i>Otites</i> var. <i>α.</i> Ldb.	685
" f. <i>β.</i> Ldb.	689
" f. <i>δ.</i> <i>densiflora</i> Otth.	686
" var. <i>Helmanni</i> Trautv.	638
" subsp. <i>Helmanni</i> Schmalh.	688
" γ. <i>macrophylla</i> Otth.	686
" f. <i>β.</i> <i>parviflora</i> Rohrb.	689
" subsp. <i>parviflora</i> Schmalh.	689
" var. <i>Pseudo-Otites</i> Borb.	686
" γ. <i>wolgensis</i> Rohrb.	685
" subsp. <i>wolgensis</i> Schmalh.	685
<i>pachyneura</i> Schischk.	660
<i>pamirensis</i> (H. Winkl.) Preobr.	670
<i>pamirensis</i> Preobr. p. p.	671
<i>parviflora</i> (Ehrh.) Pers.	689
" var. <i>glabriuscula</i> M. Pop.	689
" var. <i>media</i> Litw.	689
<i>paucifolia</i> Ldb.	626
<i>pendula</i> L.	614
<i>petraea</i> Ldb.	661
" Adams.	663
<i>physocalyx</i> Ldb.	606
<i>pluriflora</i> Schischk.	642
<i>polaris</i> Kleop.	687
<i>Popovii</i> Schischk.	659
<i>porrigens</i> L.	776
<i>praemixta</i> M. Pop.	617, 620
" var. <i>rupestris</i> M. Pop.	680
<i>Prilipkoana</i> Schischk.	658
<i>procumbens</i> Murr.	601
<i>propinqua</i> Schischk.	635
<i>pruinosa</i> Boiss.	656
<i>pseudototites</i> Bess.	686
<i>pseudotenuis</i> Schischk.	678
" var. <i>Schischkini</i> M. Pop.	678
<i>puberula</i> Boiss.	635
<i>pugionifolia</i> M. Pop.	643
<i>pygmaea</i> Ad.	661
<i>quadriloba</i> Turcz.	711
<i>quinquevulnera</i> L.	612

	Pag.
Silene racemosa <i>ε. euxina</i> Boiss.	612
„ <i>γ. iberica</i> Boiss.	610
„ <i>δ. rubrifolia</i> Boiss.	612
„ <i>β. Sibthorpiana</i> Boiss.	611
Raddeana Trautv.	605
radians Kar. et Kir.	641
repens Ldb.	654
repens Patr.	654
„ var. <i>macilenta</i> Bge.	669
„ var. <i>transcaucasica</i> Trautv.	654
Royeni Pers.	710
ruinarium M. Pop.	709
rupestris L.	630
rupicola M. Pop.	672
Ruprechtii Schischk.	631
„ var. <i>congesta</i> Boiss.	631
„ var. <i>pumila</i> Schischk.	631
„ var. <i>stenophylla</i> Som. et Lev.	631
sachalinensis F. Schmidt	710
sahendica Boiss. et Buhse	640
salsa Boiss.	682
salsuginosa Fom.	623
samarkandensis Preobr.	604
„ subsp. <i>conformifolia</i> Preobr.	604
saponaria Fries	863
sarawschanica Rgl.	645
saxatilis M. B.	631
„ Sims.	632
saxatilis <i>δ. daghestanica</i> Boiss.	620
scabrifolia Kom.	677
Schafta Gmel.	669
Schimperiana var. <i>latifolia</i> Litw.	637
Schmalhauseni Schischk.	641
Semenovii Rgl.	651
schugnanica B. Fedtsch.	680
sibirica (L.) Pers.	676
sisianica Boiss. et Buhse	660
solenantha Trautv.	638
spatulata M. B.	661
spergulifolia (Desf.) M. B.	652
spergulifolia var. <i>clavata</i> Trautv.	652
„ var. <i>ellipsoidea</i> Trautv.	652
stenophylla Ldb.	627
stylosa Bge.	625
suaveolens Kar. et Kir.	711
subspathulata Schur	616
subuniflora Som. et Lev.	662
suffrutescens M. B.	647
supina Ldb.	669
supina M. B.	656
supina <i>α. genuina</i> Rohrb.	656
„ var. <i>latifolia</i> Hohen.	657

	Pag.
supina <i>β. pruinosa</i> Rohrb.	656
swertiifolia Boiss.	641
tachtensis Franch.	638
talyschensis Schischk.	611
tarbaghataica Kryl.	669
tatarica (L.) Pers.	619
„ <i>β. foliosa</i> Rgl.	625
„ <i>δ. macrostyla</i> Rgl.	624
„ <i>γ. Wilfordii</i> Rgl.	624
Tatianae Schischk.	668
tenella C. A. M.	639
tenerrima M. Pop.	659
tenuifolia Otth	627
tenuis Bge.	625
„ Willd.	626
„ b. <i>Jenissea</i> Rohrb.	627
„ c. <i>pauciflora</i> Rohrb.	625, 627
„ var. <i>Ruprechtiana</i> Trautv.	626
Thirkeana C. Koch	611
tomentella Schischk.	648
trajectorum Kom.	679
trajectorum var. <i>pseudotenuis</i> M. Pop.	678
„ var. <i>Schischkini</i> M. Pop.	678
transcaucasica Bordz.	654
turcomanica Kleop.	688
turcomanica Schischk.	603
turgida M. B.	664
turkestanica Rgl. (1873)	672
turkestanica Rgl. et Schmalh. (1882)	620
uniflora Roth	597
Vallesia Ldb.	668, 672
„ <i>β. caucasica</i> Bge.	668
venosa Aschers.	596
„ b. <i>commutata</i> Gurke	597
viridiflora L.	674
viscariaefolia Boiss.	637
viscidula Kom.	678
viscosa Pers.	710
„ var. <i>quadrifolia</i> Trautv.	711
„ f. <i>multifida</i> Kryl.	711
vulgaris Gurcke	596
wolgensis (Willd.) Bess.	685
Silenoideae A. Br., trib.	573
Soda Fourr.	220
„ Dumort., sect.	220
Spanizium Griseb.	861
„ <i>ocymoides</i> Griseb.	867
Spectabiles Fenzl., sect.	508
Spergella Rchb., sect.	472
Spergella <i>nodosa</i> Fenzl	472
Spergula L.	550
„ <i>arvensis</i> <i>β. leiosperma</i> Čelak.	551

	Pag.		Pag.
Spergula <i>arv.</i> var. <i>linicola</i> A. Swartz . . .	552	Sphragidanthus Iljin, sect.	245
„ <i>marginata</i> Moris.	555	Spinacia L.	75
„ var. <i>maxima</i> Koch	552	<i>divaricata</i> Turcz.	107
„ γ. <i>maxima</i> Mert. et Koch	552	<i>domestica</i> Borekh.	75
„ <i>pentandra</i> Wirzen	555	<i>fera</i> L.	107
„ <i>a. sativa</i> Rehb.	551	„ Pall.	94
„ <i>a. sativa</i> Mert. et Koch	551	<i>glabra</i> Mill.	75
„ β „ II <i>praevisa</i> Asch. et Gr.	552	<i>inermis</i> Moench.	75
„ β. <i>trachysperma</i> Neilr	551	<i>minor</i> C. Koch	77
var. <i>vulgaris</i> Fleisch et Lindem.	551	<i>oleracea</i> L.	75
„ <i>A. vulgaris</i> I <i>maxima</i> b <i>linicola</i> Asch. et Gr.	552	„ var. <i>glabra</i> Gürke	75
„ β. <i>vulgaris</i> Mert. et Koch	551	„ β. <i>inermis</i> Peterm.	75
<i>laricina</i> L.	513	„ var. <i>spinosa</i> Asch. et Gr.	75
<i>linicola</i> Boreau	552	<i>spinosa</i> Moench.	75
<i>maxima</i> Weihe	552	<i>tetrandra</i> Minkw.	76
<i>micrantha</i> Bge.	472	<i>tetrandra</i> Stev.	77
<i>Morissonii</i> Boreau	555	<i>turkestanica</i> Iljin	76
<i>niealis</i> Lindbl.	475	„ var. <i>brevispina</i> Iljin	77
<i>nodosa</i> L.	472	„ f. <i>laevis</i> (M. Pop.) Iljin	76
<i>pentandra</i> L.	555	„ f. <i>rugosa</i> (M. Pop.) Iljin	76
<i>pentandra</i> Fenzl	555	Spirolobeae C. A. M., subfam.	173
„ β. <i>Morissonii</i> Doll.	555	Stellaria L.	389
<i>praevisa</i> Link	552	<i>Alexeenkoana</i> Schischk.	422
<i>saginoidea</i> L.	472	<i>alpestris</i> Fries	404
<i>sativa</i> Boenningh.	551	<i>alsine</i> Grimm	409
<i>semidecandra</i> Turcz.	472	„ var. <i>planifolia</i> Fenzl	410
<i>stricta</i> Sw.	507	„ <i>undulata</i> Fenzl	410
<i>vernalis</i> Willd.	555	<i>alsinoides</i> Boiss.	423
<i>vulgaris</i> Boenningh.	551	<i>amblyosepala</i> Schrenk	398
Sperguleae Vierh., trib.	549	<i>anagalloides</i> C. A. M.	410
Spergularia J. et C. Presl.	556, 561	<i>anomala</i> Rehb.	436
<i>campestris</i> (L.) Aschers.	558	<i>apetala</i> Ucria	397
<i>diandra</i> (Guss.) Heldr. et Sart.	557	<i>aquatica</i> Scop.	430
„ var. <i>leiosperma</i> M. Pop.	557	<i>arctica</i> Schischk.	418
<i>exilis</i> Fenzl	562	<i>biflora</i> L.	516
<i>marginata</i> (DC.) Kitt.	557	<i>borealis</i> Bigel.	404
<i>marina</i> Griseb.	557, 561	„ <i>a. corollina</i> Fenzl	411
<i>media</i> Presl	557, 561	„ β. „ <i>lusus sachalinensis</i> Rgl.	411
„ Boiss.	561	<i>brachypetala</i> Rge.	405
„ var. <i>heterosperma</i> Fenzl.	561	„ var. <i>erecta</i> Bge.	405
„ var. <i>marginata</i> Fenzl	557	„ var. <i>procumbens</i> Kryl.	405
<i>pentandra</i> G. Don	555	<i>Brotherana</i> Trautv.	515
<i>rubra</i> J. et C. Presl	558	<i>Bungeana</i> Fenzl	345
„ var. <i>campestris</i> Fenzl	558	<i>calycantha</i> (Ldb.) Bong.	404
<i>salsuginea</i> Fenzl	557	„ var. <i>apetala</i> Fenzl	404
<i>segetalis</i> G. Don	562	<i>cerastoides</i> L.	435
<i>semidecandra</i> Kittel	562	<i>cherleriae</i> (Fisch.) Williams	420
Spergulastrum L. C. Rich.	394	„ var. <i>alp na</i> Schischk.	419
Spergulifoliae Boiss., sect.	652	„ <i>apetala</i> Williams	420
Spermacocca Iljin, subsect.	177	„ <i>fasciculata</i> Willams	420
		„ var. <i>uniflora</i> Fisch.	420

	Pag.
<i>Stellaria cherl. var. typica</i> Williams . . .	419
<i>ciliatosepala</i> Trautv.	415
<i>crassifolia</i> Ehrh.	402
„ <i>var. eriocalcina</i> Schischk.	402
„ <i>var. linearis</i> Fenzl	402
„ <i>oblongifolia</i> Fenzl	402
<i>dahurica</i> Willd.	415
„ <i>var. glabrata</i> Fenzl	416
„ <i>var. glaucescens</i> Schischk.	416
„ <i>var. villosa</i> Fenzl	416
<i>dahurica</i> Spreng	420
<i>dichotoma</i> L.	397
<i>dichotoma a. cordifolia</i> Bge.	397
„ <i>β. heterophylla</i> Fenzl	397
„ <i>β. heterophylla</i> Rgl.	398
„ <i>γ. lanceolata</i> Bge.	397
„ <i>δ. linearis</i> Fenzl	397
„ <i>δ. oblonga</i> Bge.	397
„ <i>β. ovata</i> Bge.	397
„ <i>ε. rigida</i> Bge.	398
„ <i>var. Schlechtendaliana</i> (Ser.) Schischk.	397, 398
„ <i>var. Stephaniana</i> (Willd.) Rgl.	397
<i>dicranoides</i> Fenzl	421
<i>diffusa</i> Willd.	410
<i>Dilleniana</i> Moench	406
<i>discolor</i> Turcz.	408
<i>ebracteata</i> Kom.	404
<i>eciliata</i> Fenzl	407
Edwardsii R. Br.	415
<i>Eschscholtziana</i> Fenzl	417
„ <i>β. tomentosa</i> Rgl.	417
„ <i>a. typica</i> Rgl.	417
<i>falcata</i> Ser.	416, 439
<i>Fenzlii</i> Rgl.	411
<i>Fischeriana</i> Ser.	417
„ <i>var. pruinosa</i> Roshev.	418
<i>floribunda</i> Fisch.	415
<i>florida</i> Fisch.	417
<i>fontana</i> M. Pop.	407
<i>Friesiana</i> Ser.	410
<i>glauca</i> Boiss.	407
„ <i>With.</i>	406
„ <i>δ. altaica</i> Rgl.	405
„ <i>a. communis</i> Fenzl	406
„ <i>a. dahurica</i> Rgl.	416
„ <i>var. lasiosepala</i> Meinsh.	408
„ <i>Laxmanni</i> Trautv.	407
„ <i>β. persica</i> Boiss.	407
„ <i>β. virens</i> Fenzl	406, 407
<i>graminea</i> L.	404
„ <i>δ. brachypetala</i> Rgl.	405

	Pag.
<i>graminea ε. hebecalyx</i> Rgl.	408
„ <i>var. hippoctona</i> Czern.	405
„ <i>lanceolata</i> Fenzl	405
„ <i>linearis</i> Fenzl	405
„ <i>stricta</i> Trautv.	415
<i>hebecalyx</i> Fenzl	408
<i>holostea</i> L.	402
<i>humifusa</i> Roth	403
„ <i>var. caespitosa f. oxysepala</i> Rgl.	402
<i>humifusa</i> Swartz	537
<i>imbricata</i> Bge.	406
<i>ingrica</i> Meinsh.	410
<i>irrigua</i> Bge.	409
<i>jaluana</i> Nakai	405
<i>karatavica</i> (Lipsch.) Schischk.	398
<i>Kotschyana</i> Fenzl	422
<i>lancifolia</i> Kom.	411
<i>Laxmanni</i> Bge.	406
<i>Laxmanni</i> Fisch.	416
<i>longifolia</i> Fries	410
<i>longifolia</i> Kom.	405
„ <i>legitima</i> Rgl.	410
<i>longipes</i> auct.	412
„ <i>Fenzl</i>	415
„ <i>var. peduncularis</i> Fenzl	411
<i>Martjanovii</i> Kryl.	421
<i>media</i> L.	395
<i>media a. decandra</i> Fenzl	396
„ <i>β. major</i> Koch	396
„ <i>var. capitata</i> Stapf	397
„ <i>gymnocalyx</i> Trautv.	395, 396
„ <i>β. oligandra</i> Fenzl	395
<i>media var. oligandra</i> Fenzl	396
„ <i>var. subgymnocalyx</i> Beg.	396
„ <i>var. trichocalyx</i> Trautv.	395, 396
„ <i>subsp. typica</i> Beg.	395
<i>Meyeriana</i> Rupr.	453
<i>mosquensis</i> M. B.	410
<i>neglecta</i> Weihe	396
„ <i>a. typica</i> Beg.	396
<i>nemorum</i> Bge.	395
<i>nemorum</i> L.	394
„ <i>b. angustifolia</i> Rgl.	395
„ <i>c. amurensis</i> Rgl.	395
„ <i>β. bracteata</i> Fenzl	394
„ <i>β. Bungeana</i> Rgl.	395
„ <i>β. Bungeana, a. latifolia,</i> <i>b. angustifolia</i> Rgl.	395
„ <i>γ. Stubendorffii</i> Rgl.	395
„ <i>a. subebracteata</i> Fenzl	394
„ <i>a. typica b. angustifolia et</i> <i>c. amurensis</i> Rgl.	395

	Pag.		Pag.
Stellaria Pallasiana Ser.	397	<i>rubra</i> Haw.	558
<i>pallida</i> (Dumort.) Piré.	397	Strepthodon Ser., sect.	439
" <i>var. capitata</i> (Stapf) Schischk.	397	Suaeda Fenzl	191
<i>palustris</i> Ehrh.	405	" Moq.	177, 182
" <i>var. alpina</i> Kryl.	406, 407	Suaeda Forsk.	177
" <i>communis</i> Fenzl	407	<i>acuminata</i> auct.	183
" <i>fennica</i> Murb.	406, 407	<i>acuminata</i> (C. A. M.) Moq.	187
" <i>imbricata</i> Kryl.	406	<i>albida</i> Pall.	127
" <i>parviflora</i> Nolte	407	<i>altissima</i> (L.) Pall.	180
" <i>virens</i> G. F. W. Mey.	406, 407	" <i>var. confertiflora</i> Fenzl	181
<i>peduncularis</i> Bge.	411	" <i>var. vulgaris</i> Fenzl	181
" <i>var. caespitosa</i> Roshev.	412	<i>arcuata</i> Bge.	182
<i>pentandra</i> Scop.	555	<i>baccifera</i> Pall.	184
<i>persica</i> Boiss.	407	<i>Biebersteiniana</i> C. Koch	179
<i>petraea</i> Bge.	419	<i>chenopodioides</i> Pall.	194
" <i>var. alpina</i> Turcz.	419	<i>confusa</i> Iljin	183
" <i>β. fasciculata</i> Turcz.	420	<i>corniculata</i> (C. A. M.) Bge.	195
" <i>γ. imbricata</i> Fenzl	419	" <i>var. drepanophylla</i> Litw.	196
" <i>β. tenuifolia</i> lus 2 Fenzl	420	" <i>var. erecta</i> Bge.	195
" <i>α. vegeta</i> Fenzl	420	" <i>prostrata</i> Bge.	195
<i>ponojensis</i> A. Arrh.	408	" <i>α. prostrata</i> Bge.	195
<i>Potanini</i> Kryl.	398	<i>crassifolia</i> Pavl.	197
<i>radians</i> L.	418	<i>dendroides</i> (C. A. M.) Moq.	181
" <i>var. uniflora</i> Ser.	418	<i>drepanophylla</i> Litw.	196
<i>rigida</i> (Bge.) Rgl.	401	<i>eltonica</i> Iljin	189
" <i>β. latifolia</i> Rgl.	401	<i>filiformis</i> Dum.	193
" <i>α. typica</i> Rgl.	398	<i>glauca</i> Bge.	178
<i>ruscifolia</i> Pall.	417	<i>gracilis</i> Moq.	184
" <i>var. Eschscholtziana</i> Hultén	417	<i>heterocarpa</i> auct.	182
<i>sabulosa</i> Fisch.	436	" Fenzl	180, 181
<i>sachalinensis</i> Takeda	411	<i>heterophylla</i> (Kar. et Kir.) Bge.	197
<i>Schlechtendaliana</i> Ser.	397	<i>hyssopifolia</i> Pall.	125
<i>schugnanica</i> Schischk.	422	<i>inderiensis</i> Volkens	177
<i>serawschanica</i> M. Pop.	398	<i>Kareliniana</i> Fenzl	188
<i>sibirica</i> (Rgl. et Til.) Schischk.	420	<i>Kossinskyi</i> Iljin	197
<i>silvatica</i> Rgl.	424	<i>leiosperma</i> Moq.	180
<i>soongorica</i> Roshev.	412	<i>linifolia</i> Pall.	177
<i>Stephaniana</i> Willd.	397	<i>Lipskyi</i> Litw.	183
<i>stricta</i> C. Koch	407	<i>macrocarpa</i> Moq.	194
" Sw.	507	<i>maritima</i> auct.	191
<i>subu'ata</i> Boeber	404	<i>maritima</i> (L.) Dumort.	193
<i>turkestanica</i> Schischk.	401	" <i>A. filiformis</i> Gr.	193
<i>uliginosa</i> Murr.	409	" <i>α. vulgaris</i> Moq.	194
<i>umbellata</i> Turcz	409	" <i>δ. macrocarpa</i> Moq.	194
<i>velutina</i> Ser.	416	<i>maxima</i> C. Koch	180
<i>villosa</i> Willd.	397	<i>microphylla</i> auct.	181
<i>virens</i> (Fenzl) Rupr.	407	<i>microphylla</i> Pall.	179
<i>viscida</i> M. B.	436	" <i>var. multiflora</i> Litw.	179, 180
<i>Winkleri</i> (Briq.) Schischk.	403	<i>microsperma</i> (C. A. M.) Fenzl	188
<i>xanthanthera</i> Pobedimova	395	" <i>α. erecta</i> Fenzl	188
Stipularia Hav.	556	<i>minima</i> (Moq.) Fenzl	183
<i>media</i> Haw.	561	<i>obtusifolia</i> Trautv.	191

	Pag.
Sueda Olufsenii Pauls.	195
<i>paradoxa</i> Bge.	178
<i>parviflora</i> Moq.	194
<i>physophora</i> Pall.	190
<i>prostrata</i> Pall.	194
„ subsp. <i>macrocarpa</i> (Moq.)	
Iljin	194
<i>pterantha</i> (Kar. et Kir.) Bge.	187
<i>pygmaea</i> (Kar. et Kir.) Iljin	183
<i>rosmarinus</i> Ehrh.	275
<i>salsa</i> (L.) Pall.	191, 194
„ <i>a. crassifolia</i> Fenzl	191
<i>sedifolia</i> Pall.	126
<i>setigera auct.</i>	183
<i>setigera</i> Fenzl	187
<i>Siewersiana</i> Pall.	134
<i>splendens</i> Grossh.	183
<i>Stauntonii</i> Moq.	178
<i>transoxana</i> (Bge.) Boiss.	188
<i>turkestanica</i> Litw.	189
<i>ussuriensis</i> Iljin	192
<i>vera</i> Fenzl	179
Suaedae Rchb.	173
Suffruticosae Rohrb., sect.	646
Sympegma Bge.	353
<i>Regelii</i> Bge.	353
<i>Synandra</i> Iljin, sect.	319
Telephieae DC., trib.	562
Telephium L.	562
<i>imperati</i> Ldb.	563
„ var. <i>orientale</i> Boiss.	563
<i>oligospermum</i> Steud.	563
<i>orientale</i> Boiss.	563
Teloxis Moq.	47
Teloxis Aellen et Iljin, subsect.	47
<i>aristata</i> Moq.	47
Tetralepides <i>lejopetala</i> Williams	839
Teutliopsis Dumort., sect.	86
Teutliopsis <i>hastata</i> Čelak.	91
<i>patula</i> Čelak.	88
<i>tatarica</i> Čelak.	95
Thelygonaceae Eichl.	371
Thelygonum L.	372
<i>alsinoideum</i> Lam.	372
<i>cynocrambe</i> L.	372
Thylacosperma Lindl.	545
Thylacospermum Fenzl	545
<i>caespitosum</i> (Camb.) Schischk.	546
<i>rupifragum</i> (Kar. et Kir.) Schrenk	546
Tissa Adans.	556
<i>campestris</i> Pax	558
<i>rubra</i> (L.) Britton	558

	Pag.
Tomenetellae Schischk., sect.	648
Tryphane Fenzl, sect.	496
Tunica (Halt.) Scop.	777
<i>arenicola</i> Nym.	777
<i>bicolor</i> Jord.	777
<i>ciliata</i> Dulac.	777
<i>pachygona</i> Fisch. et Mey.	778
<i>prolifera</i> Scop	779
<i>saxifraga</i> (L.) Scop	777
<i>stricta</i> (Bge.) Fisch. et Mey.	778
<i>xerophila</i> Jord.	777
Turbinaria Boiss., sect.	793
Vaccaria Medic.	802
<i>parviflora</i> Moench	802
<i>pyramidata</i> Medic.	802
<i>segetalis</i> (Neck.) Garcke	802
<i>vulgaris</i> Host	802
Vahlenbergella Blytt.	714
Velezia L.	869
<i>rigida</i> L.	869
Verruculosi Boiss., sect.	860
Versiccloria Schischk., sect.	799
Viridiflorae Boiss., sect.	674
Viscago <i>viscosa</i> Moench	710
<i>wolgensis</i> Hornem.	685
Viscaria Roehl.	576
<i>alpina</i> (L.) G. Don.	577
<i>intermedia</i> Ldb.	626
<i>viscaria</i> Voss.	576
<i>viscosa</i> (Scop.) Anders.	576
„ var. <i>albiflora</i> (Sweet) Rouy	576
<i>vulgaris</i> Roehl.	576
Vitmannia Endl.	370
<i>Turcz.</i>	370
Wahlbergella Fries	714
<i>affinis</i> Fries	220
„ Tolm.	719
<i>apetala</i> Fries	716
<i>baicalensis</i> Tolm.	723
<i>angustiflora</i> Rupr.	720
<i>brachypetala</i> Freyn	722
<i>gracilis</i> Tolm.	721
<i>longicarpophora</i> Tolm.	714
<i>macropetala</i> Rupr.	716
<i>Suczaviana</i> Tolm.	715
<i>sogdiana</i> Tolm.	715
<i>taimyrensis</i> A. Tolm.	721
<i>tristis</i> Freyn	716
<i>uniflora</i> Fries	716
<i>uralensis</i> Rupr.	716

	Pag.		Pag.
<i>Vahlbergella VahlII</i> Rupr.	720	<i>lanata</i> Maerkl.	125
<i>Wierzbickia</i> Rehb.	508	<i>sedoides</i> Moq.	126
<i>Willemetia arenaria</i> Maerkl.	131		
<i>caspiica</i> A. Lehm.	126	<i>Xeraea globosa</i> O. Kze.	369
<i>hirsuta</i> Moq.	127		

VEGETATION REGIONS OF THE USSR

Abbreviated name

Full name

I. Arctic

- | | |
|----------------------|------------------------|
| 1. Arc. Eur. | Arctic (European part) |
| 2. Nov. Z. | Novaya Zemlya |
| 3. Arc. Sib. | Arctic (Siberia) |
| 4. Chuk. | Chukchi |
| 5. An. | Anadyr |

II. European part

- | | |
|-----------------------|-----------------|
| 6. Kar.-Lap. | Karelia-Lapland |
| 7. Dv.-Pech. | Dvina-Pechora |
| 8. Balt. | Baltic States |
| 9. Lad.-Ilm. | Ladoga-Il'men |
| 10. U. V. | Upper Volga |
| 11. V.-Kama | Volga-Kama |
| 12. U. Dnp. | Upper Dnieper |
| 13. M. D. | Middle Dnieper |
| 14. V.-Don | Volga-Don |
| 15. Transv. | Transvolga area |
| 16. U. Dns. | Upper Dniester |
| 17. Bes. | Bessarabia |
| 18. Bl. | Black Sea area |
| 19. Crim. | Crimea |
| 20. L. Don | Lower Don |
| 21. L. V. | Lower Volga |

III. Caucasus

- | | |
|------------------------|------------------------|
| 22. Cisc. | Ciscaucasia |
| 23. Dag. | Dagestan |
| 24. W. Transc. | Western Transcaucasia |
| 25. E. Transc. | Eastern Transcaucasia |
| 26. S. Transc. | Southern Transcaucasia |
| 27. Tal. | Talysh |

IV. West Siberia

- | | |
|---------------------|--|
| 28. Ob | Ob region (from the eastern slopes of
the Urals to the Yenisei River) |
| 29. U. Tob. | Upper Tobol |
| 30. Irt. | Irtysh |
| 31. Alt. | Altai |

V. East Siberia

32. Yenisei	Yenisei
33. Lena-Kol.	Lena-Kolyma
34. Ang.-Say.	Angara River-Sayans
35. Dau.	Dauria

VI. Far East

36. Kamch.	Kamchatka
37. Okh.	Okhotsk
38. Ze.-Bu.	Zeya-Bureya
39. Uda	Udar River area
40. Uss.	Ussuri
41. Sakh.	Sakhalin

VII. Soviet Central Asia

42. Ar.-Casp.	Aral-Caspian
43. Balkh.	Lake Balkhash area
44. Dzu-Tarb.	Dzungaria-Tarbagatai
45. Kyz. K.	Kyzyl-Kum
46. Kara K.	Kara-Kum
47. Mtn. Turkm.	Mountainous part of Turkmenistan
48. Amu D.	Amu Darya
49. Syr D.	Syr Darya
50. Pam.-Al.	Pamir-Alai
51. T. Sh.	Tien Shan

Accepted Regions for Indication of General Distribution of Species Appearing in "Flora of the U. S. S. R."

I. Arc.	Arctic (Spitsbergen, Greenland and farther)
II. Scand.	Scandinavia (Norway, Denmark, Sweden, Finland)
III. Centr. Eur.	Central Europe (Germany, Poland, Czechoslovakia, Hungary, Austria, Switzerland)
IV. Atl. Eur.	Atlantic Europe (Netherlands, Belgium, England, France, Portugal)
V. Med.	Mediterranean (including North Africa)
VI. Bal.-As. Min.	Balkan Peninsula and Asia Minor
VII. Arm.-Kurd.	Lesser Armenia and Kurdistan
VIII. Iran.	Iran and Afghanistan
IX. Ind.-Him.	India and Himalayas
X. Dzu.-Kash.	[Dzungaria-Kashgar area] Eastern or Chinese Turkestan (Sinkiang)
XI. Mong.	Mongolia

XII. Jap.-Ch.	Japan and China
XIII. Ber.	North American coast of the Bering Sea
XIV. N. Am.	North America (U. S. A. and Canada)
XV. Tib.	Tibet

Other Geographical Abbreviations

Afr.	Africa
Aust.	Australia
Centr.	Central
E.	East(ern)
Gr.	Great, Greater
I.	Island
Is.	Islands
Mt.	Mount
Mts.	Mountains
N.	North(ern)
R.	River
S.	South(ern)
W.	West(ern)

TRANSLATOR'S NOTE

1. The Russian term "Srednyaya Aziya" is, in English, Central Asia (or Soviet Central Asia). Therefore the term Middle Asia has been used for Russian "Tsentral'naya Aziya," which is non-Soviet inner Asia, comprising western China (Sinkiang and Tibet) and Mongolia.

2. According to Russian usage, the European part of the USSR is "eastern Europe." Therefore "western Europe" includes the whole of Europe outside the USSR.

EXPLANATORY LIST OF ABBREVIATIONS OF RUSSIAN
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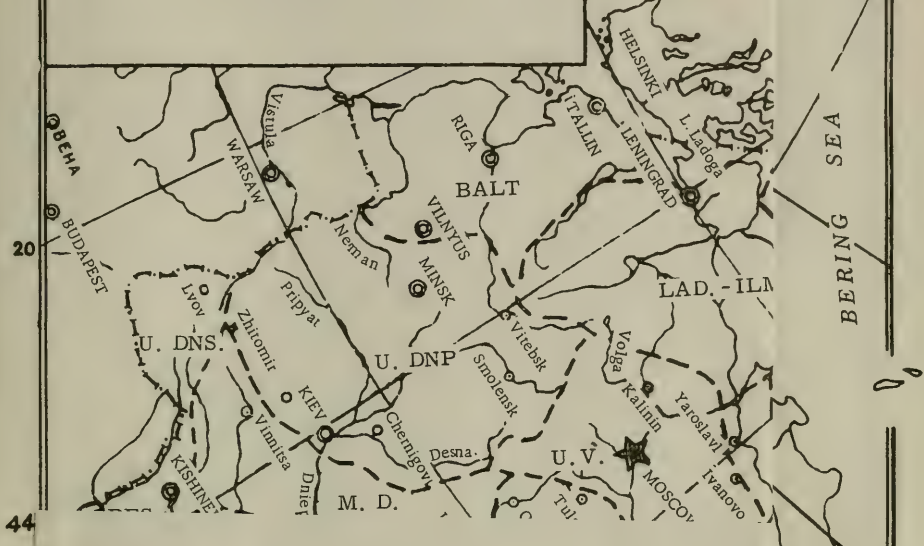
Abbreviation	Full name (transliterated)	Translation
Byull. Sredneaz. Gos. Univ.	Byulleten' Sredneaziatskogo gosudarstvennogo universi- teta	Bulletin of the Soviet Central Asian State University
Farmatsevt. zhurnal	Farmatsevticheskii zhurnal	Pharmaceutical Journal
Fl. Mosk. gub.	Flora Moskovskoi gubernii	Flora of the Moscow Province
Fl. Tifl.	Flora Tiflisa	Tiflis Flora
Geobot. och. Mugansk. st.	Geobotanicheskii ocherk Muganskoi stepi	Geobotanical Survey of the Mugan Steppe
Geogr. Ar. -Kasp. kr.	Geografiya Aralo-Kaspiiskogo kraya	Geography of the Aral-Caspian Region
Ill. Fl. Mosk. gub.	Illyustrirovannaya Flora Moskovskoi gubernii	Illustrated Flora of the Moscow Province
Ischisl. rast. Podol'sk. gub.	Ischislenie rastenii Podol'skoi gubernii	Estimation of Plants of the Podolsk Province
Izv. Inst. Pochv. i Geob. SAGU	Izvestiya Instituta pochvoveden- iya i geobotaniki Sredne- aziatskogo gosudarstvennogo universiteta	Bulletin of the Institute of Soil Science and Geo- botany of the Soviet Central Asian State University
Khoz. Osv. pustyn' Sr. Azii	Khozyaistvo osvoeniya pustyn' Srednoi Azii	Management of the Development of the Soviet Central Asian Steppes
Kievsk. Univ. Izv.	Kievskii Universitet. Izvestiya	Kiev University. Bulletin
Kompleksn. [eksp.] pust. Karsakpaya	Kompleksnye [ekspeditsii] pustyni Karsakpaya	Comprehensive [Expeditions] of the Karsakpai Steppe
Mater. dlya Bot. geogr. Ar. -Kasp. kraya	Materialy dlya Botanicheskoi geografii Aralo-Kaspiiskogo kraya	Materials for the Phytography of the Aral-Caspian Regio

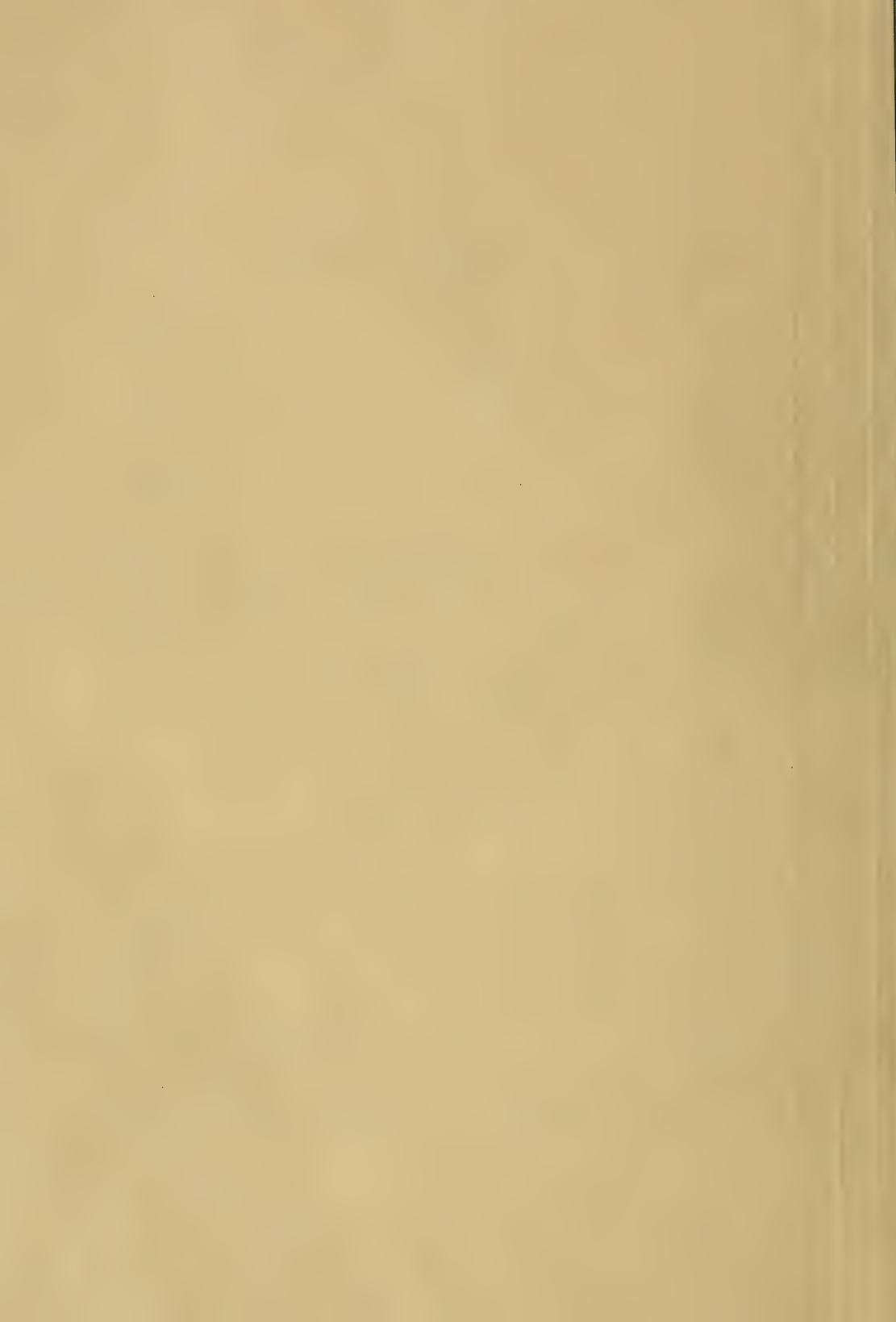
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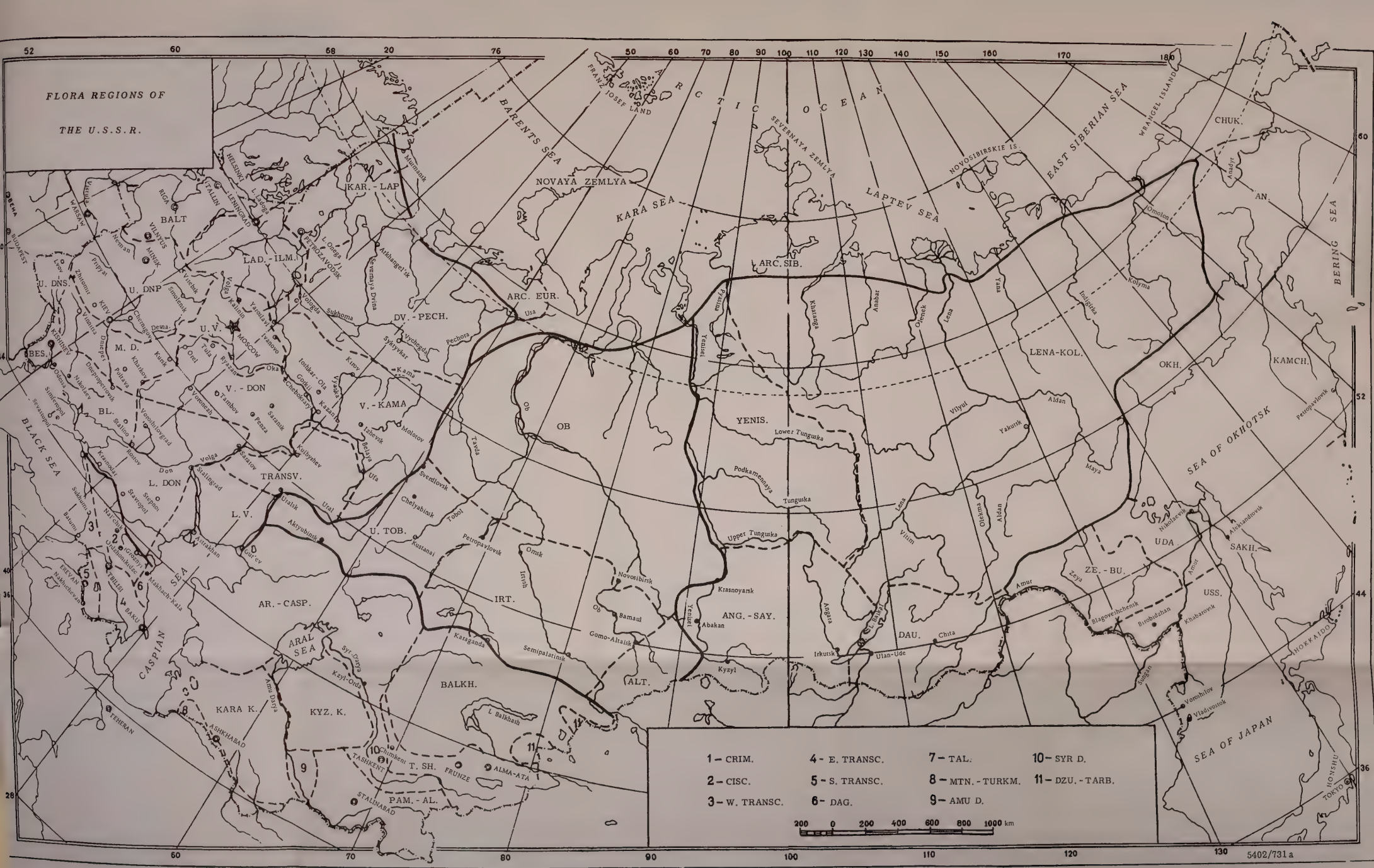
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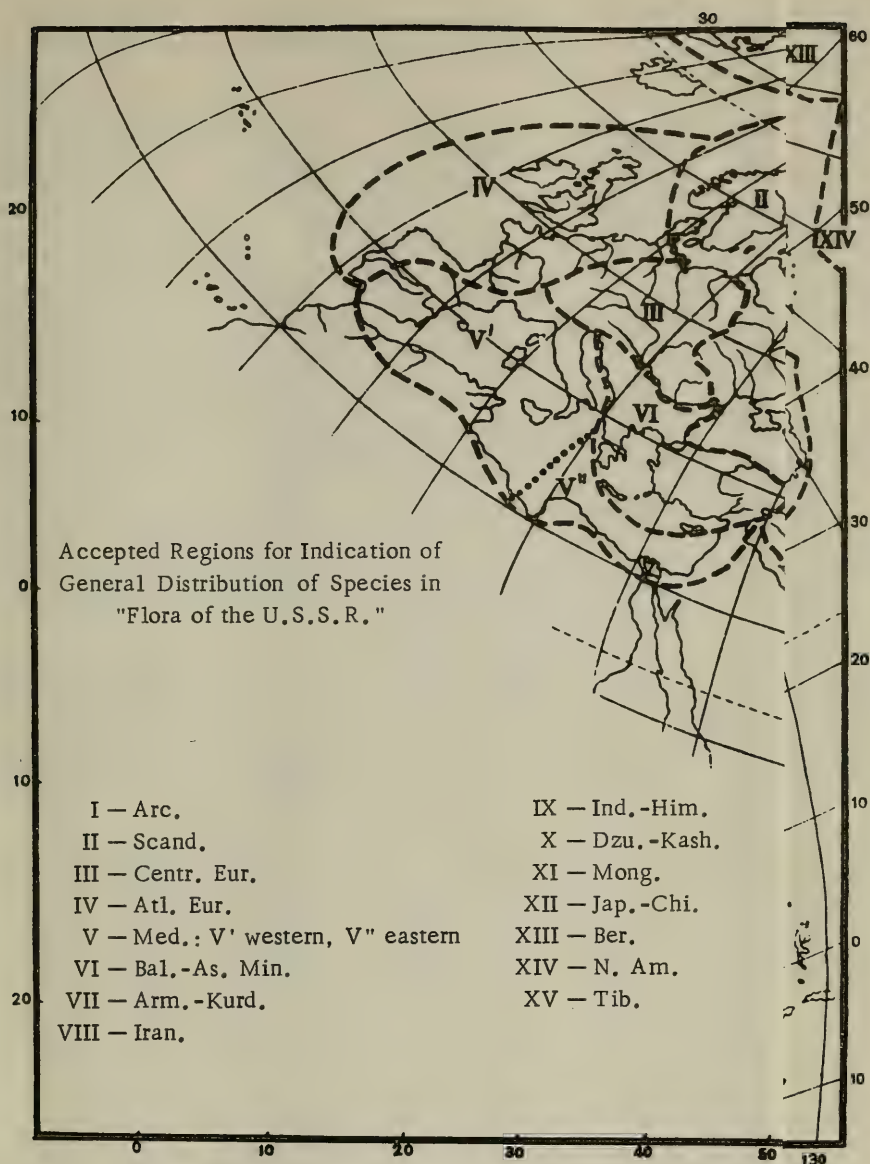
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THE U.S.S.R.



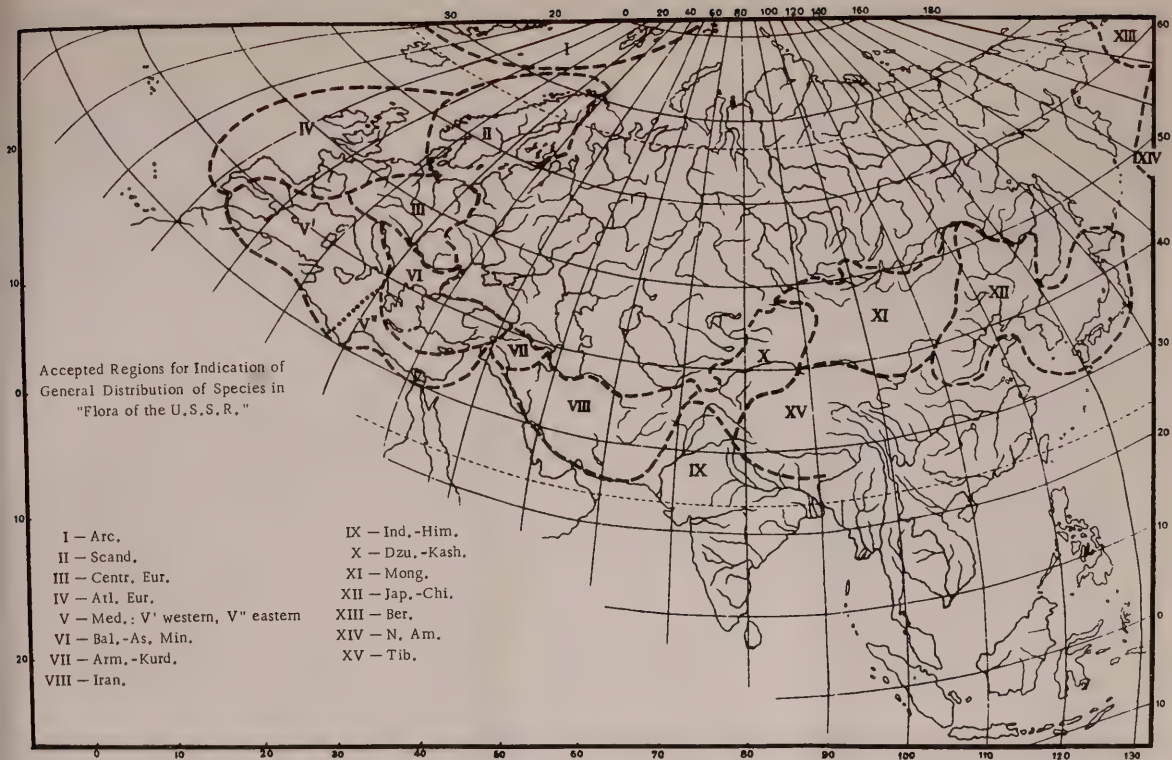






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Mater. k flore ostrovov Nov. Zemli i Kol- gueva	Materialy k flore ostrovov Novoi Zemli i Kolgueva	Materials on the Flora of Novaya Zemlya and Kolguev Island
Mat. Komiss. eksp. issl. Akad. Nauk SSSR	Materialy Komissii ekspeditsion- nykh issledovaniy Akademii Nauk SSSR	Materials of the Commission of Expeditionary Investigations of the Academy of Sciences of the USSR
Opr. rast. Kavk. i Kryma	Opredelitel' rastenii Kavkaza i Kryma	Key to Plants of the Caucasus and Crimea
Opr. rast. Tashk.	Opredelitel' rastenii Tashkenta	Key to Plants of Tashkent
Pochv. eksp. v bass. rr. Syr-Dar'i i Amu-Dar'i	Pochvennaya ekspeditsiya v v basseinakh rek Syr-Dar'i i Amu-Dar'i	Soil Expedition to the Basins of the Syr- Darya and Amu- Darya Rivers
Pochv. issl. v bass. rr. Syr-Dar'i i Amu-Dar'i	Pochvennoe issledovanie v basseinakh rek Syr-Dar'i i Amu-Dar'i	Soil Survey in the Basins of the Amu- Darya and Syr- Darya Rivers
Potan. v vost. ch. Semipalat. obl.	Potanin v vostochnoi chasti Semipalatinskoi oblasti	Potanin in the Eastern Part of the Semi- palatinsk Region
Pril. k "Zap. Im. Akad. Nauk"	Prilozhenie k "Zapiskam Imperatorskoi Akademii Nauk"	Supplement to the "Reports of the Imperial Academy of Sciences"
Rast. Perovsk. u.	Rasteniya Perovskogo uezda	Plants of Perovsk District (County)
Tr. Sr. Az. Gos. Univ.	Trudy Sredneaziatskogo gosudarstvennogo universiteta	Transactions of the Soviet Central Asian State University







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